United States
Department of
Agriculture

Forest Service

**Pacific
Northwest
Region**

Umatilla
National
Forest

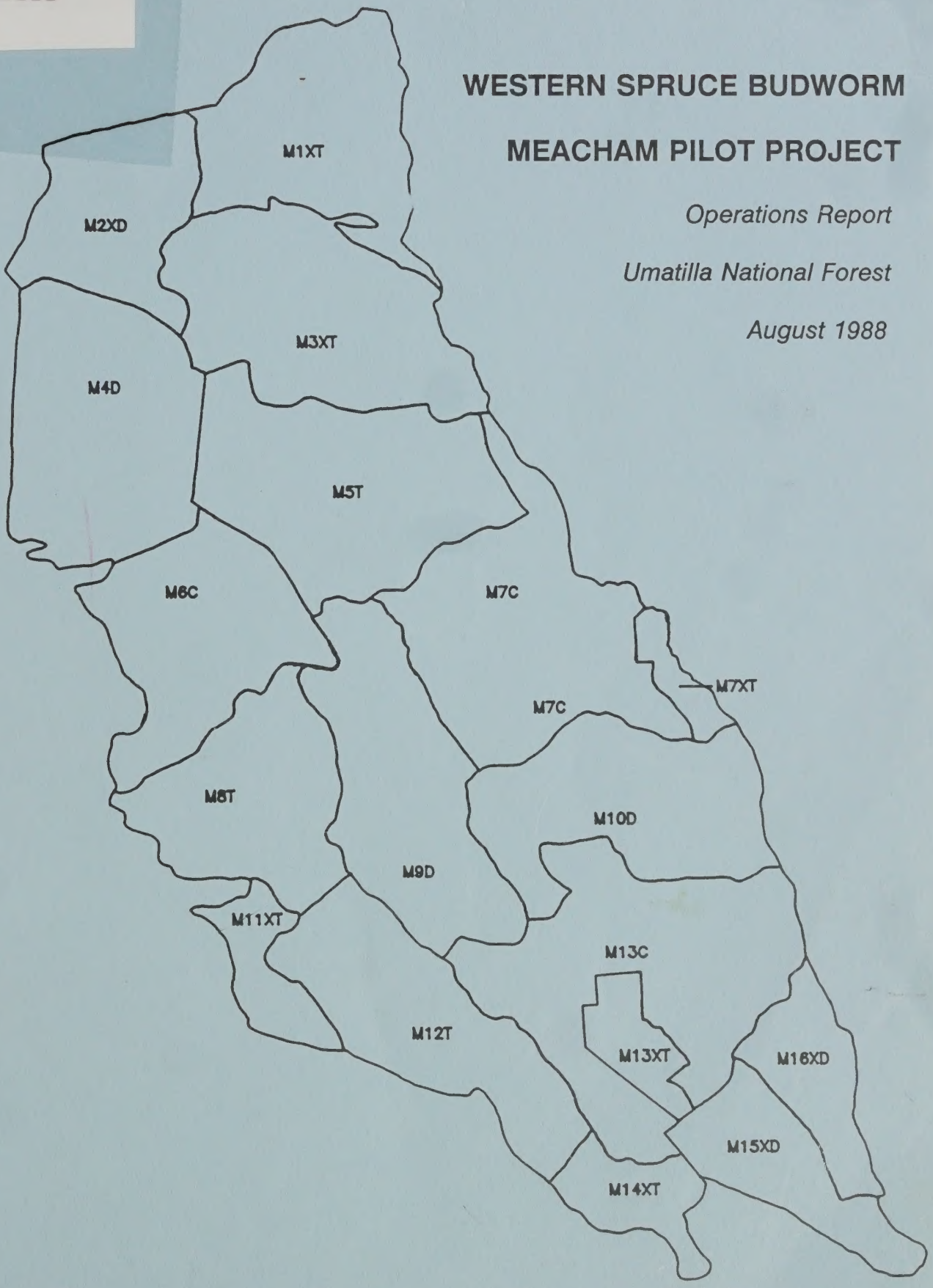
WESTERN SPRUCE BUDWORM

MEACHAM PILOT PROJECT

Operations Report

Umatilla National Forest

August 1988



1988 WESTERN SPRUCE BUDWORM SUPPRESSION PROJECT

SUMMARY TABLE FOR OPERATIONAL ANALYSIS UNITS
REGION 6

ANALYSIS UNIT	ACRES	INSECTICIDE	OZ/ACRE	BIU/ACRE	NO. OF PLOTS	POST-TREATMENT DENSITY
Barlow	115,034	Dipel 6L	42.7	16	116	0.35 ± 0.05
Barlow	25,225	Thuricide 32LV	64	16	38	0.71 ± 0.35
Warm Springs	186,468	Thuricide 32LV	64	16	58	0.57 ± 0.08
Dalles	116,418	Thuricide 32LV	64	16	79	2.40 ± 0.36
Tollgate	103,769	Thuricide 32LV	64	16	121	0.60 ± 0.08
Starkey	2,894	Thuricide 32LV	64	16	17	1.42 ± 0.38
Meacham	11,115	Thuricide 48LV	42.7	16	23	2.08 ± 0.44
Meacham	8,028	Dipel 6AF	42.7	16	16	0.97 ± 0.16

SUMMARY TABLE FOR 1988 MEACHAM PILOT PROJECT
REGION 6

ANALYSIS UNIT	ACRES	INSECTICIDE	OZ/ACRE	PRE-TREATMENT DENSITY	POST-TREATMENT DENSITY	PERCENT MORTALITY
Meacham	20,268	Dipel 6AF	42.7	17.84 ± 0.86	2.17 ± 0.25	87.8
Meacham	18,297	Thuricide 48LV	42.7	19.36 ± 0.91	1.04 ± 0.16	94.6
Meacham	27,001	Untreated	N/A	17.33 ± 1.10	7.93 ± 0.50	54.2

SUMMARY TABLE FOR 1988 MT. HOOD SPECIAL PROJECT
REGION 6

ANALYSIS UNIT	ACRES	INSECTICIDE	OZ/ACRE	PRE-TREATMENT DENSITY	POST-TREATMENT DENSITY	PERCENT MORTALITY
Warm Springs	8,645	Thuricide 32LV	64	4.68 ± 0.41	0.27 ± 0.06	94.2
Barlow	6,108	Dipel 6L	42.7	9.19 ± 0.99	0.87 ± 0.10	90.5
Barlow	3,616	Untreated[1]	N/A	1.01 ± 0.27	0.17 ± 0.10	83.2

[1] Populations had nearly collapsed in the one untreated block from which these samples were taken.

WESTERN SPRUCE BUDWORM

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CHAPTER 1

INTRODUCTION

As part of a continuing national effort to evaluate new pesticide formulations, the Pacific Northwest Region (R-6) conducted a pilot project using *Bacillus thuringiensis* Berliner (*B.t.*) against the western spruce budworm (*Choristoneura occidentallis* Freeman) in northeastern Oregon during 1988. This project was designed to gather both operational and efficacy information to aid in future project planning. This report summarizes project activity through the treatment phase plus a data summary from the evaluation phase. Data summaries are presented for those data available at this time. No statistical analyses are included. A comprehensive project report with complete analysis of all project data and final recommendations will be prepared at a later date.

The major purpose of this project was to evaluate the operational use of two commercial water-based formulations of *B.t.* when applied undiluted at 16 BIU's per acre. The materials selected for this evaluation were Dipel 6AF and Thuricide 48LV. Both were applied at 42.7 oz. per acre using Hiller 12E Soloy helicopters equipped with six Beecomist nozzles.

At the request of the FPM staff in the Washington Office, an advisory team met in Savannah, Georgia in November 1987 to establish guidelines and formulate alternatives for a pilot project in 1988. At that time, R-6 was directed to determine if suitable budworm population areas were available that meet the evaluation needs. Following three additional planning meetings in Portland, R-6 selected the Meacham Analysis Unit on the Umatilla National Forest for this evaluation. This project was administered by the Umatilla National Forest in cooperation with State of Oregon, Umatilla Indian Reservation, Wallowa-Whitman National Forest, and a number of commercial and private landowners. Forest Sevice, BLM, NOAA, and OSDF detailers were assigned to the Umatilla NF to conduct the project. A project headquarters was established on Airport Road in Pendleton, Oregon. Aircraft and related application services were provided through a contract with Western Helicopter Services in Newburg, Oregon. Both *B.t.* products and dye were purchased by the Forest Service.

The northwestern Oregon budworm outbreak is now in its seventh year. Budworm defoliation was first detected in 1980. By 1981, over 300,000 acres were recorded with defoliaton and in 1982, 178,549 acres were treated on the Malheur and Umatilla National Forests. Although portions of the outbreak have been treated from time to time, by 1987 the outbreak had spread to over 6 million acres in Oregon and Washington. Due in part to the continued impact on the forest resource and the large outbreak area involved, R-6 planned the largest aerial application project in the Northwest. An Environmental Assessment and Decision Notice were issued by the R-6 Regional Forester on January 8, 1988. Plans were then initiated to treat seven analysis units (Figure 1). The Meacham Pilot project was one of five units of the operational project. Following adjustments in areas due to population changes, etc., 612,425 acres were treated in 1988. To better contend with a project of this scope and size, the Incident Command System (ICS) was implemented for the first time on an insect suppression project. An Area Command organization was established in Portland for support of the three incident organizations.

Information and reports for any of the other units are available from the Forest Pest Management Office in Portland, Oregon.

Figure 1. Analysis Units selected for treatment in Region 6 during 1988.

CHAPTER 2

FOREST OVERVIEW

The Umatilla National Forest has become keenly aware of the threat which forest pests are to the maintenance and continued use of forest resources. The Forest is actively pursuing ways to control forest pests while minimizing the impact on the environment. The Meacham Test Pilot Project provided an opportunity to test a biological insecticide under field conditions, and also provided an excellent example of a well-managed, accident-free operation. Larry Stipe and the entire Meacham organization are to be commended for their leadership and professional attitude. Their coordination with the Forest, other agencies, and private landowners provided for a safe and trouble-free application.

Area Command provided positive leadership and direction in adapting the Incident Command System to the Project and insuring a successful operation. The Forest felt it was a part of the operation through the Project Incident Status Summaries and Area Command Situation Reports. There were numerous opportunities for local involvement through media releases and field trips. Alexis Jackson did an outstanding job of public information and in-service briefings and operational tours.

An important follow-up to any operation is a review process. A Review Team was organized early enough in the operation to gather information and interview team members. Carrying the review process to completion should provide excellent opportunities to insure that future projects are as effective and efficient as possible in pest management on public lands.

CHAPTER 3

OBJECTIVES

This pilot project was conducted to evaluate the operational efficacy of high-potency, low-volume (undiluted) commercial aqueous *B.t.*

Specifically, the pilot project objective was to evaluate the ability of Dipel 6AF and Thuricide 48LV, applied undiluted in 42.7 ounces per acre (16 BIU's per acre), to reduce western spruce budworm populations under operational conditions. Currently, Region 6 uses a population reduction standard of less than 1.0 budworm larva or pupa per 45 cm branch tip on operational projects. Past experience shows that acceptable, barely detectable, levels of budworm defoliation result when populations are reduced to below 1.0 budworm per branch tip, averaged over a treated analysis unit. Furthermore, this level of population reduction probably enhances the ability of budworm natural enemies to achieve regulation of budworm numbers to maintain the normally low endemic population levels of a stabilized population. The pilot project was designed to determine to what degree either or both of the *B.t.* products can achieve budworm population reductions to less than one insect per branch. In addition, the overall field performance and acceptability of these products were monitored, including but not limited to, storage and handling, "sprayability," flowability, atomization, characterization, etc.

Specific tasks:

1. Measure budworm population reduction and current year's foliage protection.

2. Identify and attempt to resolve any operation problems associated with the undiluted application at low volume of two commercial formulations of *B.t.*

3. Determine unit cost of *B.t.* when applied at 16 BIU's per acre.

4. Evaluate the use of Loran C coordinate data via a Pathlink recorder for tracking aircraft position and certain equipment parameters.

5. Evaluate the use of hand-held data recorders to determine if paper form and data entry time could be eliminated.

6. Evaluate spray application based on examination of treated foliage and how needle deposit relates to budworm mortality.

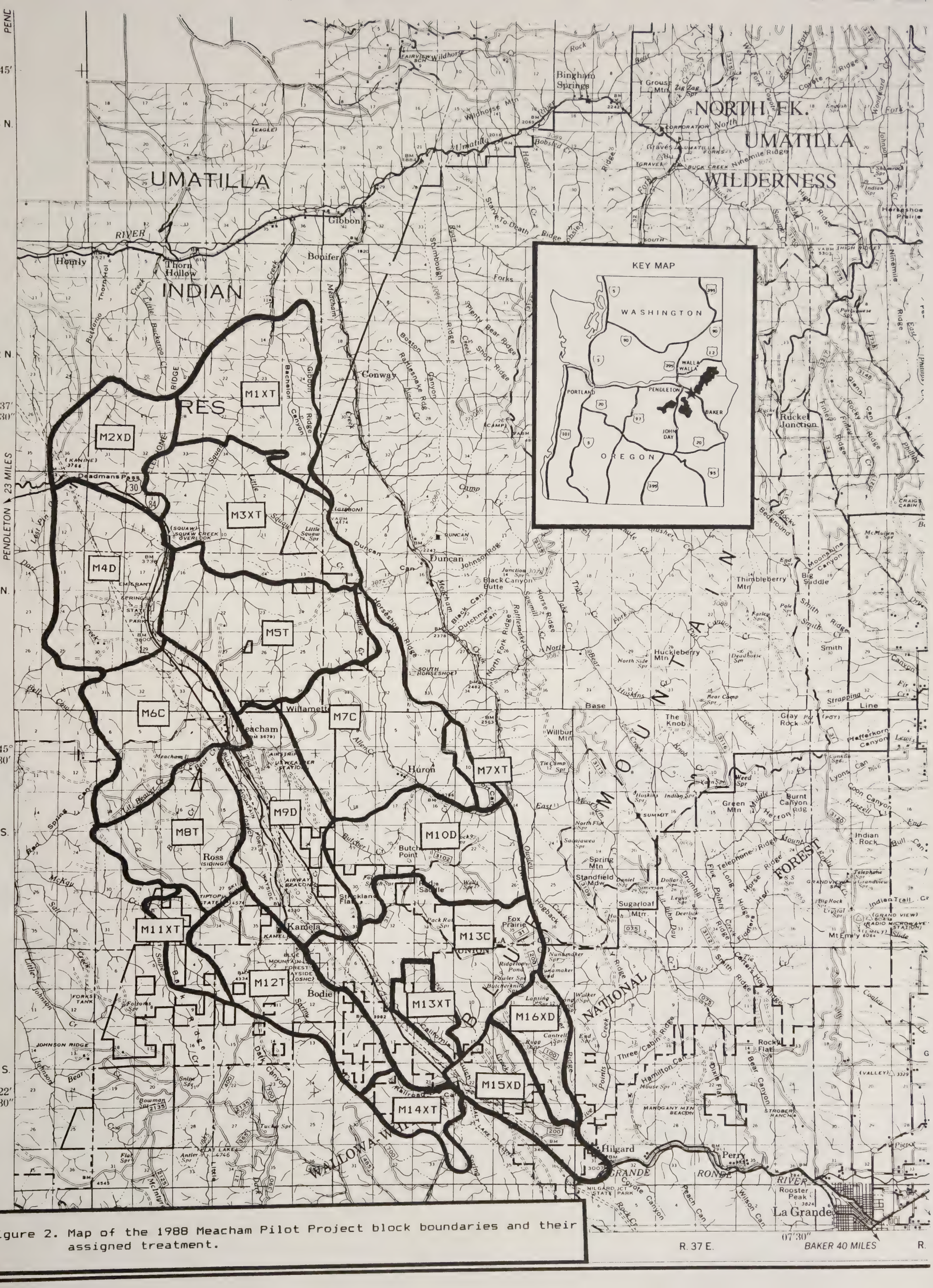
7. Evaluate a lower crown sampling technique developed by PNW-LaGrande, that could replace the need for a mid-crown sample.

CHAPTER 4

PROJECT AREA

This project was located in the mixed-fir stands along the Blue Mountain crest between Pendelton and LaGrande, Oregon. This area has a long history of budworm outbreaks. Egg mass and other data collected during 1987 forecast moderate to heavy defoliation over most of the unit in 1988. Gross area of the Meacham unit was 97,000 acres of which 57,708 acres were treated. Additional areas within the Meacham unit were set aside as untreated control blocks.

The following map (Figure 2) indicates the overall project area, the 18 blocks, and the selected treatments for the Meacham unit. The letters D, T, and C in the block identifier indicate Dipel, Thuricide, and control. The X signifies these blocks were sprayed but not used as part of the pilot project evaluation.


KEY MAP
WASHINGTON
OREGON
WALLA WALLA
PENDLETON
PORTLAND
BAKER
JOHN DAY
UMATILLA
WILDERNESS
NORTH FK.
UMATILLA
INDIAN
RES
M1XT
M2XD
M3XT
M4D
M5T
M6C
M7C
M7XT
M8T
M9D
M10D
M11XT
M12T
M13C
M13XT
M14XT
M15XD
M16XD
Gibbon
Bonifer
Homly
Thorn Hollow
Conway
Deadmans Pass
Duncan
Kamela
Ross
Bodie
Huron
Willamette
Meacham
Hilgard
Perry
La Grande
Ruckel Junction
Sugarloaf Mtn
Huckleberry Mtn
Thimbleberry Mtn
Big Saddle
Rocky Flat
Mt Emily
Indian Rock
Green Mtn
Gray Rock
The Knob
Bingham Springs
Grouse Mtn
Standfield Mdw
Spring Mtn
Fox Prairie
Butch Point
Black Canyon Butte
Johnson Ridge
Horseshoe Ridge
Rattlesnake Ridge
Boston Ridge
Plenty Bear Ridge
Short Ridge
Three Cabin Ridge
Dixie Flat
Strapping Line
Rooster Peak
Wildhorse Mtn
Grave Creek Butte
Ninemile Ridge
Squaw Creek Overlook
Tiptop State Forest Wayside
Blue Mountain Forest Wayside
Emigrant Springs State Park
Meacham Pilot Project
Figure 2. Map of the 1988 Meacham Pilot Project block boundaries and their assigned treatment.
PENDLETON 23 MILES
BAKER 40 MILES
R. 37 E.
T. 3 N.
T. 2 N.
T. 1 N.
T. 1 S.
T. 2 S.
45° 37' 30"
45° 30'
22' 30"
07' 30"

CHAPTER 5

INSECTICIDES

Both Dipel 6AF and Thuricide 48LV are commercial formulations of spores and crystalline bodies produced by the bacterium *Bacillus thuringiensis* (*B.t.*) Berliner. For *B.t.* to be effective, it must be ingested. *B.t.* has no contact action. In the high pH of the budworm hind gut, the crystalline inclusion bodies soon dissolve releasing a toxin that paralyzes and disrupts the gut wall. Larval feeding stops within 30 minutes to 2 hours following a label dose. Death generally follows in 3 to 5 days. Unlike chemical insecticides, by their nature, *B.t.* formulations are very selective, and thus, extremely safe in the environment.

Neither product has shown any phytotoxicity when applied at the label rate. The Environmental Protection Agency has exempted *B.t.* from any residual tolerance requirements in raw agricultural commodities for both man and domestic animals. The residual life of *B.t.* is quickly reduced by ultraviolet light. *B.t.* spore counts return to background levels within 2 or 3 days following treatment.

Enclosed are specimen product labels for Dipel 6AF and Thuricide 48LV.

SPECIMEN

NOT REGISTERED IN CALIFORNIA

dipel 6AF®
WORM KILLER

Bacillus Thuringiensis Insecticide

AQUEOUS FLOWABLE
BIOLOGICAL INSECTICIDE

Active Ingredient:
Bacillus thuringiensis, var. kurstaki,
10,750 International Units of Potency per mg
(48 billion International Units per gallon) 2.15%
Inert Ingredients 97.85%

KEEP OUT OF REACH
OF CHILDREN

CAUTION

E.P.A. Registration No. 275-59
E.P.A. Est. No. 33762-IA-1

CAUTION

Avoid contact with skin, eyes or clothing. In case of contact immediately flush eyes or skin with plenty of water. Get medical attention if irritation persists.

BENEFICIAL INSECTS

Honeybees foraging treated areas are not harmed by DIPEL 6AF use.

DIPEL 6AF does not interrupt the activities of beneficial and predacious arthropods in pest management programs.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

STORAGE: Keep containers tightly closed when not in use. At temperatures less than 0°F and greater than 100°F, DIPEL 6AF should be stored under cover. Roll or shake the drum before dispensing.

PESTICIDE DISPOSAL: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

CONTAINER DISPOSAL: Triple rinse (or equivalent). Then puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

DAYS TO HARVEST: There are no restrictions on applying DIPEL 6AF up to the time of harvest.

DIRECTIONS FOR USE

DIPEL 6AF is a highly selective insecticide for use against listed caterpillars (larvae) of lepidopterous insects. Close scouting and early attention to infestations is highly recommended. Larvae must eat deposits of DIPEL 6AF to be affected. Always follow these directions:

- Treat when larvae are young (early instars) before extensive damage has occurred.
- Larvae must be actively feeding on treated, exposed plant parts.
- Thorough spray coverage is needed to provide a uniform deposit of DIPEL 6AF at the site of larval feeding.
- Under heavy pest population pressure, use the higher label rates and/or raise gallonage to improve spray coverage.
- If attempting to control a pest with a single spray, make the treatment when egg hatch is essentially complete, but before extensive crop damage occurs.
- A spreader-sticker which has been approved for use on growing and harvested crops may be added to improve weather-fastness of the spray deposits.

After eating a lethal dose of DIPEL 6AF, larvae stop feeding within the hour and will die within several days. Dying larvae move slowly, discolor, then shrivel, blacken and die.

DIPEL 6AF may be applied in conventional ground or aerial equipment with quantities of water sufficient to provide thorough coverage of infested plant parts. The amount of water needed per acre will depend on weather, spray equipment, and local experience. Fill the mix tank or plane hopper with the desired quantity of water. Start the mechanical or hydraulic agitation to provide moderate circulation before adding DIPEL 6AF.

Always add the sticker to the water prior to the addition of DIPEL 6AF. Add the desired volume of DIPEL 6AF to the tank or plane hopper and continue circulation. Include rinse water from containers. Maintain the suspension while loading and spraying. Do not mix more DIPEL 6AF than can be used in a 144-hour period. CAUTION: Rinse and flush spray equipment thoroughly following each use.

DIPEL 6AF FOR TREES AND SHRUBS

Crop	Pest	Pints/100 Gals[1] (Ground Equipment)	Pints/Acre (Aerial[2] Application)
Forest, shade, sugar maple trees and shrubs	Gypsy Moth	⅔ to 3⅓	1⅓ to 3⅓
	Browntail Moth	⅔ to 2⅔	1⅓ to 2⅔
	Bagworm	⅔ to 1⅓	⅔ to 1⅓
	Redhumped Caterpillar	⅓ to ⅔	⅓ to ⅔
	Spring & Fall Cankerworm	⅓ to ⅔	⅓ to ⅔
	Fall Webworm	⅔	⅔
	Elm Spanworm	⅔ to 1⅓	⅔ to 1⅓
	Tent Caterpillars	⅓ to ⅔	⅔ to 1⅓
	California Oakworm	⅓ to ⅔	⅓ to ⅔
	Pine Butterfly	1⅓	1⅓
	Spruce Budworms[3]	1⅓ to 3⅓	1⅓ to 3⅓
	Saddled Prominent Caterpillar	⅔ to 1⅓	⅔ to 1⅓
	Douglas Fir Tussock Moth	1⅓	1⅓
	Western Tussock Moth	⅔ to 1⅓	—
	Fruittree Leafroller	⅔ to 1⅓	—
	Blackheaded Budworm	1⅓	—
	Mimosa Webworm	⅔ to 1⅓	—
	Jack Pine Budworm	⅔ to 1⅓	1 to 1⅓
	Saddleback Caterpillar	⅔ to 1⅓	—

[1]Water dilution rate for hydraulic sprayer may be varied depending on coverage. For mist blowers, mix the applicable amount (pts.) in up to 10 gallons of water.

[2]For aerial application use in up to 10 gallons of water depending on type and density of trees. For best results, spray systems which deliver droplet size of 200 microns or less should be used.

[3]Use rates greater than 1⅓ pints in Northern states for heavy populations. DIPEL 6AF may be sprayed undiluted for the control of spruce budworm.

NOTICE TO USER

Seller makes no warranty, express or implied, of merchantability, fitness or otherwise concerning use of this product other than as indicated on the label. User assumes all risks of use, storage or handling not in strict accordance with accompanying directions.

ABBOTT LABORATORIES
Chemical & Agricultural Products Division
North Chicago, Illinois 60064

October, 1985 Printed in U.S.A. AG-3457

THURICIDE®

ACTIVE INGREDIENT:	
Bacillus thuringiensis Berliner, potency of 12,000 International Units (at least 18 million viable spores) per milligram*	2.4%
INERT INGREDIENTS:	97.6%
	100.0%

*Equivalent to 12.0 billion International Units per quart.

KEEP OUT OF REACH OF CHILDREN

CAUTION

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS:

Avoid inhalation or contact with eyes or open wounds.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Suspension must be shaken or stirred before use. Pour the recommended amount of THURICIDE 48LV into the required volume of water in the spray tank. Agitate as necessary to maintain suspension. Do not allow diluted sprays to remain in the tank for more than 72 hours. THURICIDE 48LV is formulated to provide desirable coverage and stickability on leaf surfaces. Additional adjuvants, spreaders, or stickers may be added but are not essential.

Ground Application:

Use adequate water to obtain good foliar coverage. Wet foliage but do not allow excessive run-off. Apply the recommended per acre rates of THURICIDE 48 LV. Use the following suggested amounts of water:

100 gallons with high gallonage hydraulic sprayers
10 gallons with mist blower

Aerial Application:

Apply THURICIDE 48LV at recommended rates by air either alone or as a spray mix diluted with water. Spray volumes of 32-128 ounces per acre are recommended. Best results are expected when THURICIDE 48LV is applied to dry foliage with a calibrated aircraft capable of obtaining droplet sizes below 300 microns and preferably in the range of 50-150 microns.

NET_____GALLONS

Zoecon Corporation, a Sandoz Company
Crop Protection Division
Palo Alto, California 94304
Made in USA

EPA EST. NO. 36299-CA-1
EPA REG. NO. 11273-42
5M1185S

RECOMMENDATIONS FOR SHADE TREES, ORNAMENTALS AND FOREST

Thorough coverage is essential when using THURICIDE® 48LV. Use the lower rates for light to moderate infestations. Use the higher rates against heavier worm infestations.

Pest	Ounces per Acre	Directions for Use
Spring and Fall cankerworm	11-22	Apply when leaf expansion reaches 40%-50% as infestation warrants. If eggs hatch over a long period of time or if reinfestation occurs, spray about 14 days after first application. For gypsy moth control where a single application is planned, apply at least 20 ounces of THURICIDE 48LV per acre.
Elm spanworm	11-22	
Tent caterpillars	11-22	
Gypsy moth	22-53	
Spruce budworm	16-53	Apply when most larvae are 3rd-4th instar. Also consider the opening of the bud cap to ensure foliage exposure.
Douglas fir tussock moth	11-22	Apply after eggs have hatched and early instar larvae are feeding on exposed foliage.
Jack pine budworm	11-22	
Bagworm	11-22	
California oak moth	11-22	
Western tussock moth	11-22	
Fruit tree leafroller	11-22	
Mimosa webworm	11-22	
Redhumped caterpillar	5-16	
Fall webworm	5-11	
Pine butterfly	16-32	

STORAGE AND DISPOSAL

STORAGE: Store in a cool place. Activity may be impaired by storage at temperatures above 90°F. Do not contaminate water, food or feed by storage or disposal.

PESTICIDE DISPOSAL: Wastes resulting from this product may be disposed of on site or at an approved waste disposal facility.

CONTAINER DISPOSAL (PLASTIC): Triple rinse (or equivalent) then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke. Reuse of thoroughly cleaned container is allowable.

CONTAINER DISPOSAL (METAL): Triple rinse (or equivalent) then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities. Reuse of thoroughly cleaned container is allowable.

WARRANTY AND CONDITIONS OF SALE

Zoecon Corporation warrants that the chemical composition of this product conforms to the chemical description on the label and is reasonably fit for the purpose stated on the label when used in accordance with directions under normal conditions of use. Zoecon makes no other warranty, express or implied, concerning the use of this product other than as indicated on the label. Buyer assumes all risks of use, storage or handling of this material not in strict accordance with directions given on the label.

CHAPTER 6

ACCOMPLISHMENTS

DAILY TREATMENT SUMMARY

Date	*Acres Sprayed*
June 14	1,593
June 15	708
June 16	4,881
June 17	5,892
June 18	8,835
June 19	7,209
June 20	7,158
June 21	8,799
June 22	10,131
June 23	2,502
Total	57,708 *1/*

1/ See figures 3 and 4.

AIRCRAFT USE SUMMARY

1. Aircraft use for Marking, Recon, and Observation Training

Aircraft used	2
Total hours flown	61.3
Recon hours	49.0
Marking hours	12.3
Passengers hauled	17
Accidents	0
Incidents	0
Power checks	1
Load calculations	1

2. Aircraft use for Observation and Block Recon during Application Period

Aircraft used	5
Total hours flown	117.6
Spray observation hours	109.6
Block recon hours	8.6
Passengers hauled	65
Accidents	0
Incidents	0
Power checks	22
Load calculations	53

3. Aircraft use for Applications

Aircraft used	6
Hours flown	125.5
Accidents	0
Incidents	2
Acres sprayed by fixed wing	0
Acres sprayed by helicopter	57,708

4. Aircraft Totals

Aircraft used	11
Acres sprayed	57,708
Hours flown	304.4

SAFETY SUMMARY

Motor vehicle accidents	1
Motor vehicle incidents	7
Vehicle miles driven	100,000
Lost-time injuries	0
Minor injuries	6

PROJECT STAFF

Forest Service detailers	
Region 1	2
Region 3	1
Region 4	1
Region 6	22
Total Forest Service	26
BLM detailers	2
NOAA	2
OSDF	6
Temporaries (local hire)	47
Grand Total	83

PRODUCT SUMMARY

	Acres treated
Pilot project evaluation blocks	
Dipel 6AF	20,268
Thuricide 48LV	18,297
Operational spray blocks	
Dipel 6AF	8,028
Thuricide 48LV	11,115
Total Sprayed	57,708

OWNERSHIP TREATMENT SUMMARY

Acres Treated by Ownership

Spray Block	Federal Lands	State Lands	C.T.U.I.R. (Indian)	Private (Other)	Cunningham Sheep Co.	Boise Cascade	Louisiana Pacific	Block Acres
M1XT	0	0	635	1,007	0	17	0	1,659
M2XD	0	0	1,074	1,206	0	21	0	2,301
M3XT	912	67	1,650	1,230	197	522	0	4,578
M4D	0	91	555	2,807	0	2,712	0	6,165
M5T	359	0	268	644	2,549	2,060	0	5,880
M7XT	293	0	0	0	142	0	0	435
M8T	27	0	335	1,134	471	10	3,390	5,367
M9D	534	139	0	125	5,188	128	1,503	7,617
M10D	4,480	0	0	187	1,433	386	0	6,486
M11XT	682	0	12	18	196	230	842	1,980
M12T	1,420	33	0	665	33	2,671	2,228	7,050
M13XT	720	0	0	0	0	0	0	720
M14XT	1,743	0	0	0	0	0	0	1,743
M15XD	2,451	0	0	680	0	79	0	3,210
M16XD	2,517	0	0	0	0	0	0	2,517
Total Treated	16,138	330	4,529	9,703	10,209	8,836	7,963	57,708

UNTREATED BLOCKS (CONTROL)

Block	Acres
M6C	6,540
M7C	9,330
M13C	11,131
Total Untreated	27,001

AFFIRMATIVE ACTION SUMMARY

	NON-MINORITY		MINORITY		
	MALE	*FEMALE*	*MALE*	*FEMALE*	*TOTAL*
Permanent (Federal)	20 (74%)	7 (26%)	0	0	27*
Permanent (State)	3 (50%)	2 (33%)	1 (17%)	0	6**
Local Hire	19 (44%)	17 (39.5%)	5 (11.5%)	2 (5%)	43***
Totals	*42*	*26*	*6*	*2*	*76*

* 25 Forest Service; 2 Bureau of Land Management

** 3 of State employees were FS retires hired through the State

*** 10 of local hires were veterans

COMMUNITY IMPACTS

A project of this size and duration has a significant impact on the local community. Itemized below is an estimate of project dollars used within the local community.

Temporary hire salary	$125,000	
Lodging	91,000	*1/*
Supplies (local purchase)	7,200	
Gasoline & oil	10,000	
Building lease	10,000	
Utilities	7,600	
Equipment rental	1,500	
	=====	
Total	$252,300	

1/ Includes the application contractors' crew and the spray deposit staff.

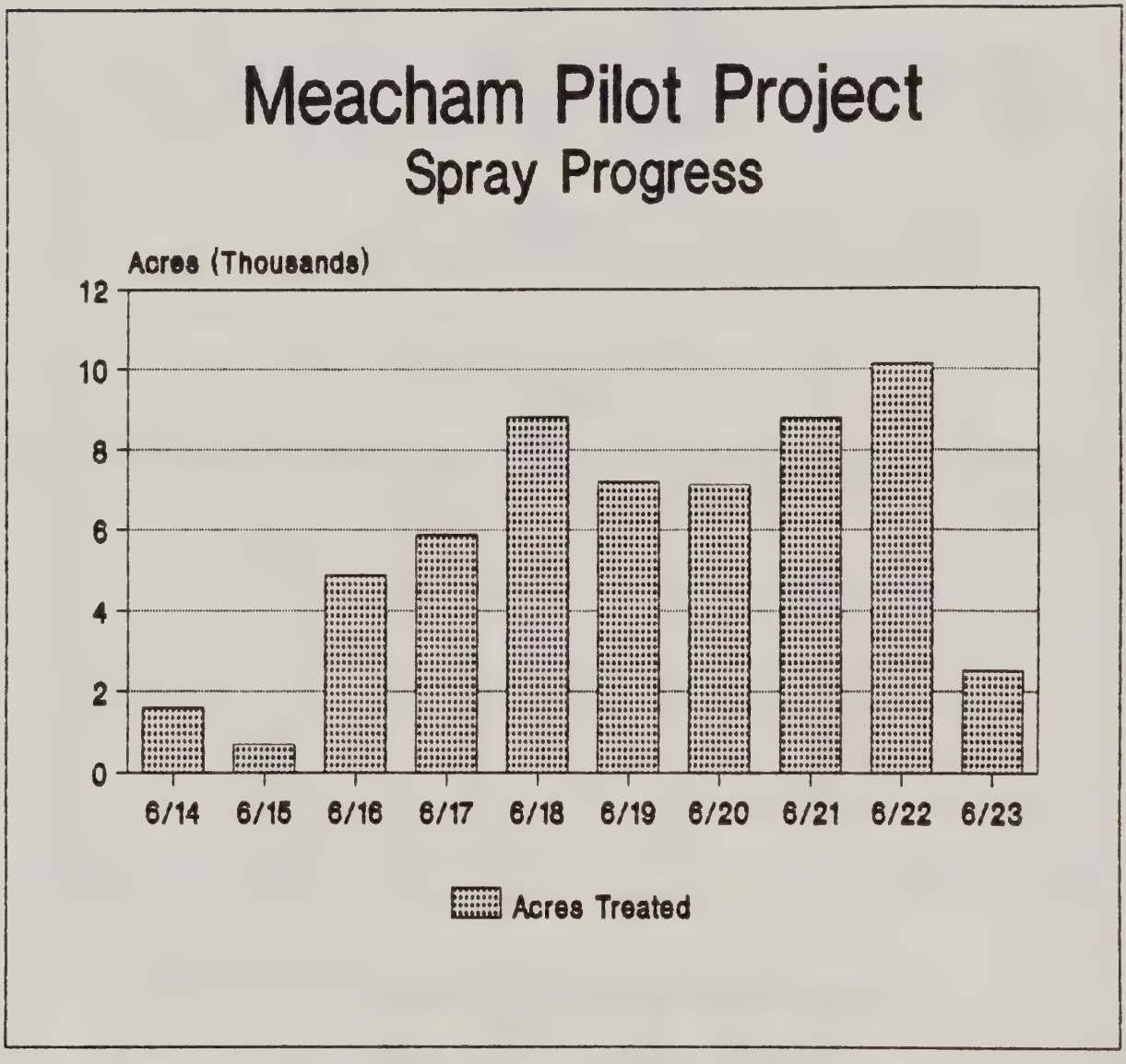


Figure 3. Acres sprayed by day for the Meacham Pilot Project during 1988.

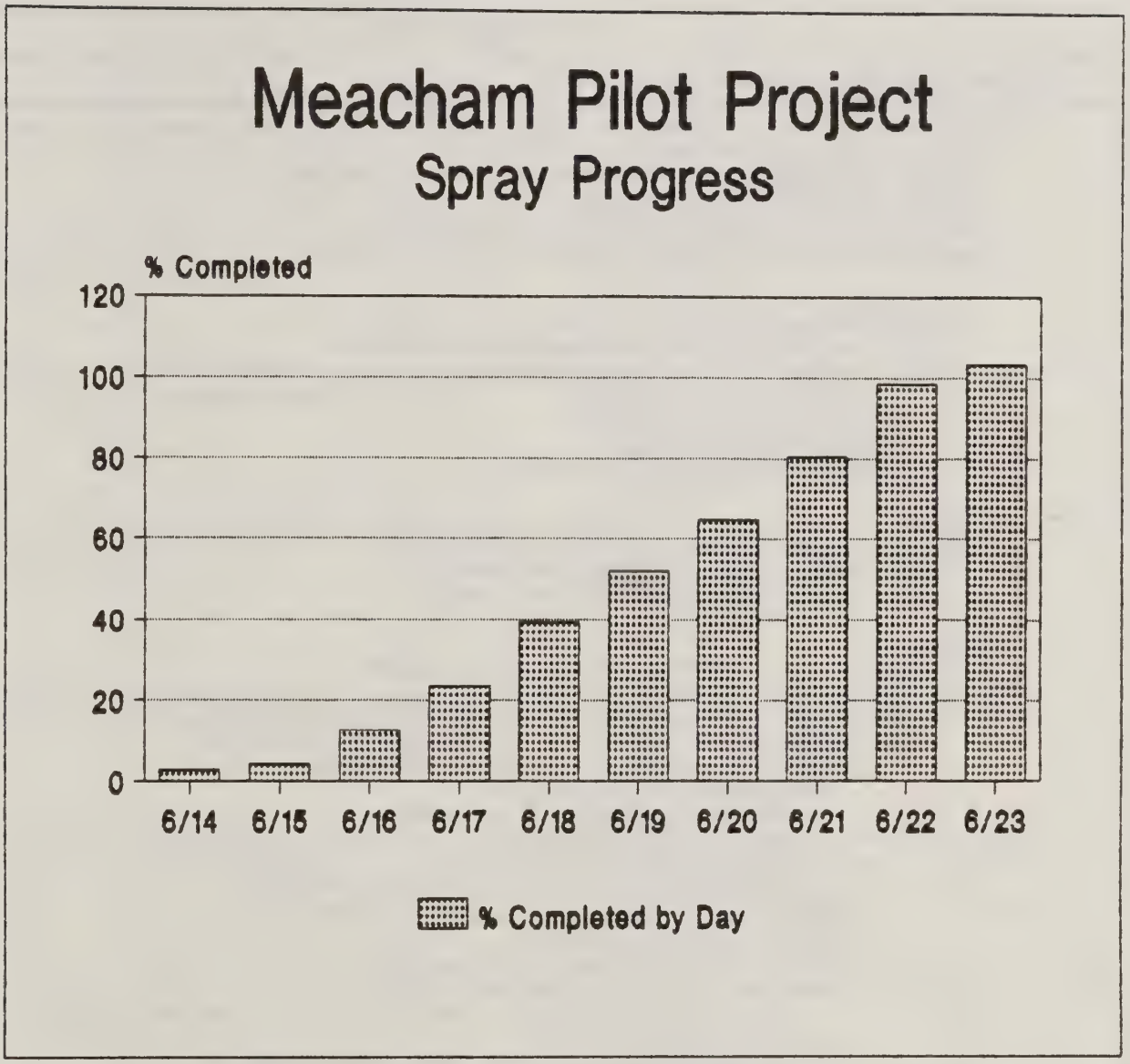


Figure 4. Percent project completed by day for the Meacham Pilot Project during 1988.

CHAPTER 7

ORGANIZATION

Organization Chart

JIM LAWRENCE, Forest Supervisor--Umatilla NF
GARY ROLLINS, Budworm Coordinator--Walla Walla RD, Umatilla NF
WOODY WILLIAMS, Area Commander--Willamette NF
LARRY STIPE, Incident Commander--TCFPM R-1
RANDY DOHRMANN, Deputy I.C.--Walla Walla RD, Umatilla NF
ALEXIS JACKSON, Information--Malheur NF
RICH THURMAN, Safety--Walla Walla RD, Umatilla NF
RANDY DOHRMANN, Liaison--Walla Walla RD, Umatilla NF

Entomology:
DON SCOTT, Entomologist--FPM, R-6
JULIE WEATHERBY, Asst. Ent--Boise Field Office, R-4
SHELLY STELLING, Lab Leader--FPM, R-6
LAB CREW (4)--UMA Temp
BOB STEVENS, Asst. Ent--OSDF
CREW (32)--UMA Temps
BOB EDER, Data Manager--TCFPM, R-1

Plans:
DEAN BISHOP, Plans--Blue River RD, Willamette NF
PAUL WERTH, Meteorologist--NOAA, Boise, ID
RICK OCHOA, Meteorologist--NOAA, Boise, ID

Operation:
GORDON ORLOFF, OPS Section Chief--BLM, Eugene
DICK WILDMAN, Air Oper. Dir.--OSDF
BARRY GRIFFITH, Dispatcher--Leavenworth RD, Wenatchee NF
LORI OSTERSTOCK, ASST OPS & ATL--Lowell RD, Willamette NF
ROBERT MONTGOMERY, AEM--Rigdon RD, Willamette NF
BRIAN LYNCH, AO--Malheur NF
JIM ROSETTI, AO--Bly RD; Fremont NF
MEL FARROW, GO--OSDF
JIM EHLI, AEM--Bly RD, Fremont NF
SHEILA HOLMAN, AO--Baker RD, Wallowa-Whitman NF
RANDY McLANDRESS, AO--Entiat RD, Wenatchee NF
JEFF SWANSON, GO--OSDF
LARRY PUTLITZ, ATL--Illinois V. RD, Siskiyou NF
Temp BILL BOETHIN, AEM--Umatilla NF
DAYLE BENNETT, AO--FPM, R-3
BEV POWELL, AEM--OSDF
JIM TROWBRIDGE, AO--Walla Walla RD, Umatilla NF
CARY SWANSON, GO--OSDF
TIM McCONNELL, Pathlink--FPM, R-6
CHARLES WIESNER, Deposit Contractor--New Brunswick
LAB CREW (10)--UMA Temps
GORDON ORLOFF, Spray COR--BLM, Eugene
NORM PARKER, Spray Contractor (Western Helicopter)

Logistics/Finance:
JIM CONN, Logistics/Finance Chief--BLM, Medford
GERRY McKINNEY, Grnd Sup/Fleet/Supp--Walla Walla RD, Uma NF
JOHN JOHNSTON, Comm Unit--Malheur NF
RAY ROBERTS, Asst Comm--Malheur NF
PENNY MARTIN, Procurement/Clerk--Crescent RD, Deschutes NF
MARTIESE ORLOFF, Time/Cost--Willamette NF

PERSONNEL DATA BY ORGANIZATION

MEACHAM FS DETAILERS

Resource No.	Name	Title	Home Unit	Report Date	Release Date
54	BENNETT, DAYLE	AOB	FPM R-3 517 GOLD AVE., S.W. ALBUQUERQUE, NM 87102 FTS 476-3190 (505) 842-3190	MAY 23	JUNE 23
55	BISHOP, DEAN	PLANS	BLUE RIVER RD BLUE RIVER, OR 97488 DG = BISHOP:406F18D01A (503) 822-3317	MAY 4	JUNE 24
57	DOHRMANN, RANDY	D IC	WALLA WALLA RD 1415 WEST ROSE WALLA WALLA, WA 99362 DG = R.DOHRMANN:R06F14D06A (509) 522-6276	MAY 2	JULY 16
58	EDER, BOB	DATA MGR.	TCFPM R-1 MISSOULA P.O. BOX 7669 MISSOULA, MT 59807 DG = B.EDER:R01A FTS 585-3476 (406) 329-3476	MAY 9	JUNE 21
06	EHLI, JIM	AEM	BLY RD P.O. BOX 25 LAKEVIEW, OR 97622 DG = J.EHLI:R06F02D01 (503) 353-2427	MAY 24	JUNE 24
04 111	GRIFFITH, BARRY	DISP	LEAVENWORTH RD 600 SHERBOURNE LEAVENWORTH, WA 98826 DG = B.GRIFFITH:R06F17D07A (509) 782-1413	MAY 11 JUNE 9	MAY 13 JUNE 24
60	HOLMAN, SHELA	AOB	BAKER RD RT. 1 BOX 1 BAKER, OR 97814 DG = S.HOLMAN:R06F16D01A (503) 523-4476	MAY 24	JUNE 24
17	JACKSON, ALEXIS Shared Tollgate	INFO	MALHEUR 139 N.E. DAYTON JOHN DAY, OR 97845 DG = A.JACKSON:R06F04A FTS 575-1731 (503) 575-1731	MAY 16	JULY 5
01	JOHNSTON, JOHN Shared Tollgate	COMMO	MALHEUR NF 139 N.E. DAYTON JOHN DAY, OR 97845 DG = J.JOHNSON:R06F04A FTS 575-1731 (503) 575-1731	APRIL 25	TOLLGATE

79	LYNCH, BRIAN	ACB	LONG CREEK RD 528 E. MAIN JOHN DAY, OR 97845 DG = B.LYNCH:R06F04D03A FTS 575-1731 (503) 575-1731	MAY 21	JUNE 26
62	MARTIN, PENNY	PROC. CLK.	CRESCENT RD P.O. BOX 208, HWY 9 CRESCENT, OR 97733 DG = P.MARTIN:R06F01D02A FTS 433-2234 (503) 433-2234	APRIL 25	JUNE 6
63	McCONNELL, TIM	PATHLINK	FPM R-6 PORTLAND P.O. BOX 3623 PORTLAND, OR 97208 DG = T.McCONNELL:R06A FTS 423-2727 (503) 2727	MAY 10	JUNE 24
64	McKENNEY, JERRY	FLEET SPLY	WALLA WALLA RD 1415 WEST ROSE WALLA WALLA, SA 99362 DG = McKENNEY:R06F14D06A (509) 522-6271	APRIL 25	JULY 16
65	McANDRESS, RANDY	AOB	ENTIAT RD P.O. BOX 476 ENTIAT, WA 98822 DG = McLANDRESS:R06F17D05A (509) 784-1511	MAY 26	JUNE 24
66	MONTGOMERY, ROBERT	AEM	RIGDON RD OAKRIDGE, OR 97463 DG = R.MONTGOMERY:R06F18D05A (503) 782-2283	MAY 23	JUNE 24
68	ORLOFF, MARTIESE	TIME COST	WILLAMET NF P.O. BOX 10607 EUGENE, OR 97440 DG = R06F18A FTS 425-6826 (503) 687-6826	MAY 2	JUNE 27
69	OSTERSTOCK, LORI	ASST OPS	LOWELL RD LOWELL, OR 97452 DG = L.OSTERSTOCK:R06F18D06A (503) 937-2129	MAY 2	JUNE 24
70	PULITZ, LARRY	ATL	ILLINOIS V RD 26568 REDWOOD HWY CAVE JUNCTION, OR 97523 DG = L.PUTLITZ:R06F11D04A (503) 592-2166	MAY 20	JUNE 19
80	ROBERTS, RAY Shared Tollgate	RADIO TECH	MALHEUR NF 139 N.E. DAYTON JOHN DAY, OR 97854 DG = R.ROBERTS:406F04A (503) 575-1731	JUNE 13	TOLLGATE

71	ROSETTI, JIM	AOB	BLY RD P.O. BOX 25 BLY, OR 97622 (503) 353-2427	MAY 11	JUNE 23
72	SCOTT, DON	ENT	FPM R-6 PORTLAND P.O. BOX 3623 PORTLAND, OR 97208 DG = D.W.SCOTT:R06A FTS 423-2727 (503) 221-2727	MAY 2	JULY 16
73	STELLING, SHELLY	LAB	FPM R-6 PORTLAND P.O. BOX 3623 PORTLAND, OR 97208 FTS 423-2727 (503) 221-2727	MAY 2	JULY 16
74	STIPE, LARRY	IC	TCFPM R-1 MISSOULA P.O. BOX 7669 MISSOULA, MT 59807 DG = L.STIPE:R01A FTS 585-3289 (406) 329-3289 or (406)251-3528	MAY 2	JULY 17
75	THURMAN, RICH	SAFETY OFFICER	WALLA WALLA RD 1415 WEST ROSE WALLA WALLA, WA 99362 DG = R.THURMAN:R06F14D06A (509) 522-6283 (509) 938-6483	MAY 9	JUNE 24
76	TROWBRIDGE, JAMES	AOB	WALLA WALLA RD 1415 WEST ROSE WALLA WALLA, WA 99362 DG = J.TROWBRIDGE:R06F15D06A (509) 522-6283	MAY 23	JUNE 24
77	WEATHERBY, JULIE	ASST ENT	BOISE FIELD OFFICE 1750 FRONT STREET BOISE, ID 83702 DG = J.WEATHERBY:R04F02A FTS 554-9021 (208) 334-1345	MAY 3	JULY 8

MEACHAM BLM DETAILERS

Resource No.	Name	Title	Home Unit	Report Date	Release Date
56	CONN, JIM	LOG/FIN	MEDFORD DIST.,. BLM 3040 BIDDGLE RD MEDORD, OR 97504 DG = BLM:R06F10A FTS 424-3756 (503) 776-4174	APRIL 25	JUNE 26
67	ORLOFF, GORDON	OPS CHIEF	EUGENE DIST., BLM P.O. BOX 10226 EUGENE, OR 97401 DG = M.ORLOFF:R06F18A FTS 403-6782 (HOME) (503) 683-6782 (503) 345-646	MAY 2	JUNE 27

MEACHAM NOAA DETAILERS

OCHOA, RICK	METEROLOGIST Shared Tollgate	NATIONAL WEATHER SERVICE 3905 VISTA AVE. BOISE, ID 83705 (208) 334-9862	JUNE 13	JUNE 25
WERTH, PAUL	METEROLOGIST Shared Tollgate	NATIONAL WEATHER SERVICE 3209 VISTA AVE. BOISE, ID 83709 (208) 334-9862	JUNE 5	JUNE 10

MEACHAM OSDF DETAILERS

FARROW, MELVIN	RT. 2, BOX 504 PENDELTON, OR 97801	MAY 23	JUNE 24
MEYER, ALBERT	100 NW CHARALOIS HGTS JOHN DAY, OR 97845	MAY 9	MAY 14
POWELL, BEVERLY	2424 WELLS RD ELKTON, OR 97436	MAY 2	JUNE 24
STEVENS, ROBERT	BOX 1619 JACKSONVILLE, OR 97530	MAY 3	JULY 7
SWANSON, CARRIE	1055 AIRPORT RD PENDLETON, OR 97801	MAY 23	JUNE 24
SWANSON, JEFF	1055 AIRPORT RD PENDLETON, OR 97801	MAY 23	JUNE 24

MEACHAM TEMPORARIES

ARNOLD, DEBRAH	P.O. BOX 941 PENDLETON, OR 97801	MAY 31	JULY 12
BALL, MATT	909 NW MAILEY PENDLETON, OR 97801	MAY 9	JUNE 9
BENDER, JEFF	2012 SW PERKINS PENDLETON, OR 97801	MAY 9	JULY 15
BEUS, DALE	3426 NE RIVERSIDE PENDLETON, OR 97801	MAY 9	JULY 15
BOETHIN, BILL	HCR 56, BOX 910 JOHN DAY, OR 97845	MAY 16	JUNE 26
BRONCHEAU, VICTORIA	RT. 1 BOX 249 PENDLETON, OR 97801	MAY 31	JULY 12
BRONCHEAU, WALTER	RT. 1 BOX 303 PENDLETON, OR 97801	MAY 9	JULY 2
BUNKER, BRIGETTE	1200 SW HAILEY PENDLETON, OR 97801	MAY 9	JULY 16
CAREY, CHRIS	616 SE 6TH PENDLETON, OR 97801	JUNE 6	JULY 12
CASTEEL, JIM	504 SW GOODWIN PENDLETON, OR 97801	MAY 9	JUNE 30
CHVILICEK, BRAD	320 N. MAIN PENDLETON, OR 97801	MAY 9	JULY 15
COOPER, CONNIE	2920 NE RIVERSIDE B PENDLETON, OR 97801	MAY 9	JULY 12
ELLISTON, KENNETH	300 SW 28TH APT 13 PENDLETON, OR 97801	MAY 9	JULY 12
FAIRCLOTH, CLAYTON	316 NW 3RD PENDLETON, OR 97801	MAY 9	JULY 15
GAYMAN, LORETTA	314 1/2 SW 19TH PENDLETON, OR 97801	JUNE 6	JULY 15
GOLDMAN, JULIE	895 W. ORCHARD HERMISTON, OR 97838	JUNE 6	JULY 12
GRIFFIN, EDWARD	1907 SW 42ND PENDLETON, OR 97801	MAY 9	JULY 12
HANDLEY, WILLIAM	1417 SW 37TH #1 PENDLETON, OR 97801	MAY 9	MAY 16
HORNING, JAYNE	429 SW 15TH PENDLETON, OR 97801	MAY 31	JULY 15
HULSE, MICHAEL	P.O. BOX 494 PILOT ROCK, OR 97868	MAY 9	MAY 16

JOHNSTON, ALBERT	700 NW 8TH PENDLETON, OR 97801	MAY 9	JULY 2
JONES, DIONE	1901 SW GOODWIN PENDLETON, OR 97801	MAY 9	JULY 12
KELLEY, RICHARD	RT. 1 BOX 261 PENDLETON, OR 97801	MAY 9	JULY 7
LACEY, JANEL	717 SW 13th PENDLETON, OR 97801	MAY 9	JUNE 30
LACEY, ANDREW	717 SW 13TH PENDLETON, OR 97801	MAY 9	JUNE 30
LEAVITT, DEENA	1023 BABCOCK BILLINGS, MT 59105	MAY 9	JULY 16
LINGLE, EVA	501 N2 8TH PENDLETON, OR 97801	MAY 9	JULY 15
LUNDELL, RICHRAD	660 NW 7TH PENDLETON, OR 97801	MAY 9	JULY 12
MARSH, CHRIS	RT. 1 BOX 402 PENDLETON, OR 97801	MAY 9	JULY 2
McDANIEL, GARY	301 ANGUS PENDLETON, OR 97801	MAY 9	JULY 2
McKINLAY, MARLENE	RT. 9 BOX 116 IDAHO FALLS, ID	MAY 9	JULY 16
McPHERSON, JACK	328 NE 44TH PENDLETON, OR 97801	MAY 9	JULY 15
MOHRLAND, JACK	1330 SW 41ST PENDLETON, OR 97801	MAY 9	JULY 15
QUAEMPIS, DAVID	RT. 1 BOX 801 PENDLETON, OR 97801	MAY 9	JULY 12
RIGWOOD, KAREN	509 NORTHGATE APT 3-B PENDLETON, OR 97801	MAY 9	JULY 1
SEPT, BRIAN	956 WALLOWA WALLA WALLA, WA 99362	MAY 9	JULY 15
SHEFF, SONJA	P.O. BOX 97 UKIAH, OR 97880	MAY 31	JULY 12
SHEOSHIPS, EMMETTS	P.O. BOX 82 ATHENA, OR 97812	MAY 9	JULY 2
SOUTHWICK, JOSEPH	P.O. BOX 121 ADAMA, OR 97810	MAY 9	JULY 15
STIPE, MARLA	6110 LINDA VISTA MISSOULA, MT 59803	MAY 9	JULY 16
STOVER, PAUL	RT. 1 BOX 810 PENDELTON, OR 97801	MAY 9	JULY 2
SUISIE, FRANCIS	P.O. BOX 631 PILOT ROCK, OR 97868	MAY 9	MAY 10

SULT, BRAD	RT.3 BOX 538 PENDLETON, OR 97801		MAY 9	JULY 12
SULT, JACK	RT. 3 BOX 538 PENDLETON, OR 97801		MAY 9	JULY 12
THOMPSON, JO ANN	RT. 1 BOX 96 PENDLETON, OR 97801		MAY 31	JULY 12
WILSON, JILL	P.O. BOX 105 HERMISTON, OR 97838		JUNE 6	JULY 15
WRIGHT, JACKIE	P.O. BOX 225 UKIAH, OR 97880		MAY 31	JULY 12
TOTAL HEAD COUNT	FS	R-1 2 R-3 1 R-4 1 R-6 22 26		
	BLM NOAA OSDA UMA TEMPS	2 2 6 47		
	TOTAL	83		

CHAPTER 8

AIR OPERATIONS

Aircraft

The marking aircraft, a 206BIII from Transwestern Helicopters, arrived May 11. Marking began on May 12. Marking was kept to a minimum because of the potential money savings, less exposure of Forest Service personnel to hazardous conditions, and many natural land features to use. A little extra marking time was needed to mark the adjusted boundary on two blocks in order to protect two research areas being used by PNW, LaGrande. The Operations Section Chief and his assistant performed the majority of the marking. This was done to allow more aircraft time for training the aerial observers, and using experienced people to mark was safer. Marking took 12.3 hours of actual marking. An additional 49.0 hours of aircraft use was used to train six aerial observers during a 2-week period. No accidents or incidents were reported.

Spraying began on June 14 with two applications and two observation aircraft. This gave us an opportunity to give all of the observers some actual spray experience before the full-scale spraying began. By June 16 we were using six application aircraft and five observation aircraft. We continued to use these 11 aircraft daily until spraying was completed on June 23. No accidents or incidents were reported with the observation aircraft.

Two incidents occurred with the application aircraft. One was a chipped light and the other was the discovery of a crack in the transmission housing during post-flight inspection. Western Helicopters has a policy which requires their pilots to pre-flight the aircraft in the daylight. Norm McGraw of Western Helicopters felt that the crack would probably not have been noticed if pre-flight had been done in the dark morning hours with a flashlight.

All air operations were based on an emergency airstrip on Cunningham Sheep property near Meacham, Oregon. Seventeen additional helispots throughout the project area were used for application of the insecticide (loading pesticide and fuel).

The application aircraft consisted of five Hiller 12E Soloys and one Bell Soloy. The Hillers came calibrated and characterized by Jim Warner of USDA Forest Service. During calibration work, the viscosity of Dipel 6AF variable caused concern that the operations batch might make problems. Our entire shipment of Dipel was used without any problem. Each was equipped with six Beecomist 360 A-1 atomizers with a simplex spray system that was modified by Western Helicopters. The modification included a gear-driven pump system to deal with the viscosities of the insecticides. Initial problems consisted of residual boom pressure and weak springs in the nozzels allowing the pesticide to continue flowing when the system was shut off. This was cured with the addition of pressure relief valves and a larger return line being installed in the system. Another problem was nozzle placement. The placement of the nozzles when they arrived caused buildup of one-fourth to one-half inch layer of insecticide to collect on the aircraft struts and skids. We moved the two inbound nozzles out about 6 inches and minimized the problem, but did not cure it.

Listed below are some facts on the aircraft and spray systems used.

Observation aircraft:

2	Bell 206 BIII	Owner - Cascade Helicopters
1	Bell 206 BIII	Owner - Transwestern Helicopters
1	Hughes 500 D	Owner - Transwestern Helicopters
1	Hughes 500 D	Owner - Midvalley Helicopters

178.9 total hours flown

Application aircraft:

5	Hiller 12 E Soloys	Owner - Western Helicopters
1	Bell Soloy	Owner - Cascade Helicopters

125.5 total hours flown

	HILLERS	BELL
Application speed	60 mph	60 mph
Flow rate	4.45 gal/min	4.44 gal/min
Nozzles	6 Beecomist atomizers	6 Beecomist atomizers
Swath width	110 feet	110 feet
Pump	Gear driven	Hydraulic
VMD	137/150	137/150

The nozzle configurations situated all nozzles in close to the aircraft body. The following measurements were made on the nozzle placements after the inbound were moved out. The measurements are from the outside of the skid to the center of the nozzles.

1st nozzle	14 inches
2nd nozzle	24 inches
3rd nozzle	34 inches

At completion of spraying, preliminary results from deposition counts from needles showed excellent results, and numerous operational card lines indicated we were meeting contract requirements.

Both products were applied at the contract rate with no product or mechanical problems. The only caution would be that to get Dipel 6AF to flow correctly, future contracts should specify a gear-driven pumping system equivalent to a Sorenson 4000. Estimated cost per aircraft of the pump modification made on five of our aircraft was $1,980. Our other ship was only used for Thuricide.

CHAPTER 9

CONTRACTING

The application contract was awarded to Western Helicopter Services, Inc. of Newberg, Oregon. The contract number was 53-0441-8-4881 with David L. Kohlhepp of the R-6 Regional Office being the contracting officer.

A prework meeting was held on May 4 in Pendleton, Oregon. This meeting included discussion of acreage variance of no more than 10 percent and the use of six observation aircraft. The contract at this time was for 56,000 acres of insecticide application, and 80 hours of boundary marking. Later discussion on May 19 resulted in a modification to reduce the required number of observation aircraft to five and reducing the contract price by $20,400. The final contract figures after this were:

56,000 acres of insecticide application = $534,240 /$9.54 acre
80 hours of marking/reconnaissance time = $30,400 /$380 hour
Total = $564,640

In addition, the contractor was required to mix the dye needed for the deposit counts.

A notice to proceed was issued on May 11 to begin the marking of boundaries on May 12, and start spraying approximately on June 1.

Marking started as planned and went well. Basic reconnaissance and marking was completed on May 18 with remaining hours to be used when the aerial observers reported to the project. The aerial observers reported on May 23 and the marking/reconnaissance aircraft returned on May 25 and was used by the observers and assistant operations chief for project training and orientation with a minor amount of additional marking.

On June 4, a decision to postpone spraying until June 11 or 12 was made because of a slow budworm and vegetation development, plus a dismal extended weather forecast (see weather chart in Chapter 14). The contractor was notified immediately and was able to stop everyone enroute to the project except two observation helicopters and two support vehicles. Everyone in operations was released on June 4 until June 11.

The contractor was notified on June 11 of our intention to start spraying on June 14 with two application aircraft and two observation aircraft. The remaining aircraft and equipment were scheduled to arrive for full contract requirements on the morning of June 15.

We finished some sub-block marking on June 12 and 13. The contractor arrived on June 13 and we discussed how the operation would work, flew reconnaissance with the application pilots, and batched the trucks in preparation for the first day of spraying.

Spraying started on June 14 on unevaluated blocks. Problems were encountered because of the inability to shut off some of the nozzles and because of the location of the Beecomist nozzles leaving a thick residue on the helicopter undercarrige and skids. The contractor was very busy working on the aircraft spray system to correct the problems and continue application.

The next day went a little better because of some spring adjustment in the nozzles and relocation of the inboard nozzles, but still was not acceptable. Replumbing the spray system with pressure relief valves solved the problems on June 16.

Remaining days of spraying presented no problems with assessment cards and initial analysis of deposition on foliage and initial budworm mortality showed good results.

Overall, Western Helicopter Services performed in their usual professional, friendly manner and made the operations portion of this project a success. In 10 days of application time, 57,708 acres were completed to contract specifications.

One additional note--Western Helicopter Services was obligated by the contract to utilize the Pathlink system in one of their application aircraft. They did this with extreme patience and cooperation. Basically, the requirement demonstrated that this type of application on small aircraft has only limited use (see Chapter 11). However, this was a very pleasant experience for the Forest Service person who was responsible for this portion of the contract requirement because of Western Helicopter Services' cooperation and attitude.

If additional details of the daily operations associated with the contract administration are desired, the contract file is located in the R-6 Contracting Office, Portland, Oregon.

CHAPTER 10

ENTOMOLOGY

Introduction

Over the past few years, new formulations of *Bacillus thuringiensis* (*B.t.*) have been introduced into the marketplace for control of foliage-feeding Lepidoptera. The advantage of these newer high-potency formulations is that they can be used in low or undiluted volumes thereby eliminating the need for mixing batches. Moreover, applying undiluted volumes of high-potency *B.t.* products can lower the application cost while increasing effectiveness (Hulme et al., 1983 and Morris et al., 1986).

The availability of new high-potency formulations and recent successes in using high-potency, ultra low volume applications of *B.t.* to reduce populations of spruce budworm, *Choristoneura fumiferana*, in the Northeast have encouraged the Forest Service to evaluate these products against western spruce budworm, *Choristoneura occidentalis* under western application conditions. The Meacham Pilot Project was designed to evaluate the operational performance of two water-based formulations of *B.t.*; Dipel 6AF and Thuricide 48LV applied at a rate of 16 billion international units (BIUs) in 42.7 oz. (undiluted) per acre. Prior to this Pilot Project, high-potency, ultralow volume applications of *B.t.* products have been used on a very limited scale against budworm in the West.

Experience from past western spruce budworm suppression projects in the Pacific Northwest Region has shown that defoliation can be contained within acceptable levels when budworm populations are reduced to an average density of less than 1.0 insect per 45-cm branch tip. At these densities, defoliation over large treated areas may range from imperceptible or barely detectable where application was good, to clearly visible where application happened to be poor or non-existent. In addition, budworm populations reduced to these levels may enhance the ability of natural enemies to achieve regulation of budworm numbers to maintain the normally low endemic levels of stabilized natural populations. The pilot project was designed to determine to what degree either or both of the *B.t.* products could achieve budworm population reductions.

Pilot Project Site Selection

Egg mass and defoliation sampling by Forest Pest Management on the Meacham Analysis Unit (Meacham AU) in the fall of 1987 indicated the presence of a relatively high and damaging western spruce budworm population. Egg mass densities over the AU averaged 12.4 masses per M^2, indicating that 1988 defoliation would be moderate to heavy. Defoliation measurements indicated an increasing defoliation trend from 1986 to 1987 (measurements for earlier years were not made). All indications from biological sampling pointed to an increasing western spruce budworm outbreak, supporting population densities high enough to provide a good evaluation of treatment efficacy.

Given the favorable budworm population levels, Forest Pest Management conducted further evaluations of the Meacham AU as a potential pilot project location during November, 1987. Various criteria were

used to determine the suitability of this analysis unit for the establishment of sampling plots to monitor populations and evaluate treatment results. Primary among those were: (1) budworm host type present; (2) accessibility to spray blocks; (3) host trees that could be sampled in both the midcrown and lower crown; (4) uniformity of terrain; and (5) the potential for locating 25 sample plots with three trees per plot on each spray block. The evaluation indicated that the Analysis Unit was favorable for establishing sampling plots for the pilot project.

Based upon this collective information Forest Pest Management, in consultation with the Umatilla National Forest, Oregon State Department of Forestry, Bureau of Indian Affairs, and various other private landowners, selected the Meacham AU as the 1988 *B.t.* pilot project site. In addition, the analysis unit was within relatively close proximity to both Pendleton and LaGrande where adaquate facilities were available to house the project headquarters and provide restaurant and lodging facilities for project personnel.

Personnel Staffing, Training, Section Operation, and Sampling Schedule

The Entomology Section Chief and assistants arrived at the Meacham Pilot Project headquarters in Pendleton the week of May 2, 1988. Their first tasks were to set up, organize, and equip the Entomology section offices and laboratories, plan the crew training, begin locating evaluation and development plot sites, and become familiar with the road system and the area.

The Entomology crew reported to work on May 9 and the first week was spent in orientation and training. Crew orientation and training were composed of both classroom and field instruction. Crews were given an orientation to the Project and the Forest Service that included such topics as Project organization and goals, the budworm and *B.t.*, time and attendance, pay, tour of duty, work hours and breaks, use of government vehicles and equipment, drug and alcohol usage, fire arms, conduct and ethics, accidents and injury reporting, Good Host program, telephone usage, sexual harassment, and various Project and Forest policy, procedures and related topics. Crews were given driver's orientation and defensive driving training, and were projected and licensed to drive 4-wheel drive pickup trucks. Crews also received multi-media first aid training, radio training, and various training in entomological sampling. The entomology training continued throughout the Project because of the varied and complex sampling and processing procedures that occurred at specific--and sometimes overlapping--points during the project. Supervisors continually reviewed various procedures because certain tasks such as classifying budworm instars and determining foliage development status proved difficult for several individuals in the beginning. Training aids and handouts were developed for the crews and proved useful in simplifying several of the procedures and instructions contained in the Entomological Sampling and Analysis Plan. Overall, most of the crews did a good job and understood and supported the project work and goals. A few individuals, on the other hand, were marginal workers or were not careful in the work or with government vehicles and equipment.

Crew members were recruited through the Oregon State Employment Division office in Pendleton. Most of the crew were local hires from the Pendleton vicinity, but a few individuals traveled from out of state, including Montana, Idaho, and Washington, to accept biological aid positions on the project. The crews were composed of 36 men and women, including those who had just graduated from high school, to

those who had recently retired from other jobs. Crews worked in pairs during all of the field sampling phases of the work. Many individuals assigned to crews worked in the same crew throughout the project. Others were assigned different crew partners, primarily due to employee resignations to take other work or because of absences. In retrospect, the Entomology section may have been slightly overstaffed during parts of the Project. Daily assignments were generally finished early and crews were often released for the day before they had worked a full 8-hour shift. However, because they were working 6 to 7 days a week, they were always able to achieve 40 hours of work a week, except on one occasion. During the peak of the workload; however, crews had plenty of work to keep them busy and often worked longer hours or overtime during this period to accomplish their tasks for the day.

Supervisors prepared daily assignment sheets the evening before the scheduled workday so that crews could be given their assignments first thing in the morning and not have to wait for the supervisory staff to get organized. This was particularly important during development sampling when data had to be collected early so that block releases could be announced at the 11:00 a.m. daily staff meeting. Each morning would begin with a briefing on the previous day's block releases and the current morning's Operation's accomplishments. The supervisor would briefly review the current day's scheduled work, review sampling procedures, conduct a safety briefing, pass out the day's work assignments, and dismiss the crews to the field. This meeting would usually last about 30 minutes and was useful in disseminating information, providing instructions, and receiving feedback from the crews.

On May 16, crews began installing evaluation and development plots and completed the task on May 22. Early density sampling was started on May 23 and sample processing was completed in the laboratory by May 24. Development sampling commenced on May 27 and continued through June 19, the day before the final blocks were released for treatment. Post-treatment sampling started July 5 and was completed on July 12. The period between June 19 and July 5 was used to sample the Meacham Analysis Unit for development to time the post-treatment sampling and to sample other areas adjacent to the AU as part of evaluation to determine potential budworm populations and need for suppression in 1989.

Sampling Design and Procedures

The pilot project utilized a randomized block design with each statistical block comprised of two treatment blocks and an untreated control block. Statistical blocks were replicated three times and the treatments were assigned at random. The replicate block assignments were as follows:

Replicate No.	*Block*
1	M4D
	M5T
	M7C
2	M9D
	M8T
	M6C
3	M10D
	M12T
	M13C

Each treatment block contained 25 three-tree evaluation plots randomly located along the road system within the block. The design included taking pre-treatment samples within 48 hours of treatment and post-treatment samples at the first sign of pupation within the block (between 14 and 21 days following treatment). In addition, immediate post-treatment samples were collected from evaluation blocks for foliage deposit assessment and bioassay. A total of 12 development plots were also established within each block to monitor budworm development for timing block releases for treatment.

The pilot project blocks comprised a total of 38,565 acres of budworm host type. Untreated control blocks accounted for 27,001 acres of this total. In addition to the pilot project blocks, the Meacham Analysis Unit contained another 19,143 acres of host type that was treated as an operational suppression project. Treatment of the operational blocks was incidental to the pilot project, however. The operational blocks were treated with either Dipel 6AF or Thuricide 48LV (Table 1).

Approximately 40 three-tree plots were established on the operational blocks for post-treatment evaluation sampling. The plots were allocated to the operational blocks in the same proportion as the proportion of host-type acres contained in each block out of the total host type occurring on all operational blocks. In addition, a minimum of three development plots were established on each operational block.

All plot locations on both pilot and operational blocks were selected so as to represent the range of elevations and aspects over the blocks (Figure 5). Sample trees selected at each plot location consisted of three Douglas-firs or three true firs. The trees were mostly open-grown, having relatively full crowns with bud-bearing branches in the midcrown, 20 to 45 feet tall, and exposed to full sun most of the day. In mixed stands, sample trees were selected from the predominant host species.

Table 1.--Meacham Budworm Project treatment assignment, host acres, and treatment status, Umatilla National Forest, 1988.

Product	Block	Host Acres	Treatment Status
Dipel 6AF	M4D	6165	Pilot Project
	M9D	7617	Pilot Project
	M10D	6486	Pilot Project
	M2XD	2301	Operational
	M15XD	3210	Operational
	M16XD	2517	Operational
Thuricide 48LV	M5T	5880	Pilot Project
	M8T	5367	Pilot Project
	M12T	7050	Pilot Project
	M1XT	1659	Operational
	M3XT	4578	Operational
	M7XT	435	Operational
	M11XT	1980	Operational
	M13XT	720	Operational
	M14XT	1743	Operational
Control	M6C	6540	Pilot Project
	M7C	9330	Pilot Project
	M13C	11131	Pilot Project

Early larval density sampling was conducted independently for the pilot project and operational portions of the analysis unit. The purpose of this sampling was to qualify each portion for treatment. An analysis unit qualified if the density over the AU averaged 4 or more budworm per 45-cm branch tip. Early larval density estimates were computed from the number of budworm collected from branches sampled at midcrown. In both the pilot and operational portions of the analysis unit, one branch from each of three trees per plot were sampled in a multi-stage sampling plan designed to provide estimates of early larval densities over the AU at a level of precision of 15 percent (Sampling Error = +/-0.15) and with a 95 percent probability that the true mean will fall within the sampling error (P = 0.05). The midcrown branches were collected with a polepruner equipped with a nylon catch basket. Apical or lateral branch tips were clipped at a length of 45-cm and collected in the catch basket. Branches were placed in paper bags, labeled, and brought back to the laboratory for processing. At the lab, current-year buds were counted and recorded and all buds and previous year's needles were examined for larvae. The larvae were collected, verified as budworm, counted, and recorded on data sheets. Data were analyzed using the Western Budworms Decision Support System (WESTBUDS) on the Data General computer to calculate the mean density and standard error statistics.

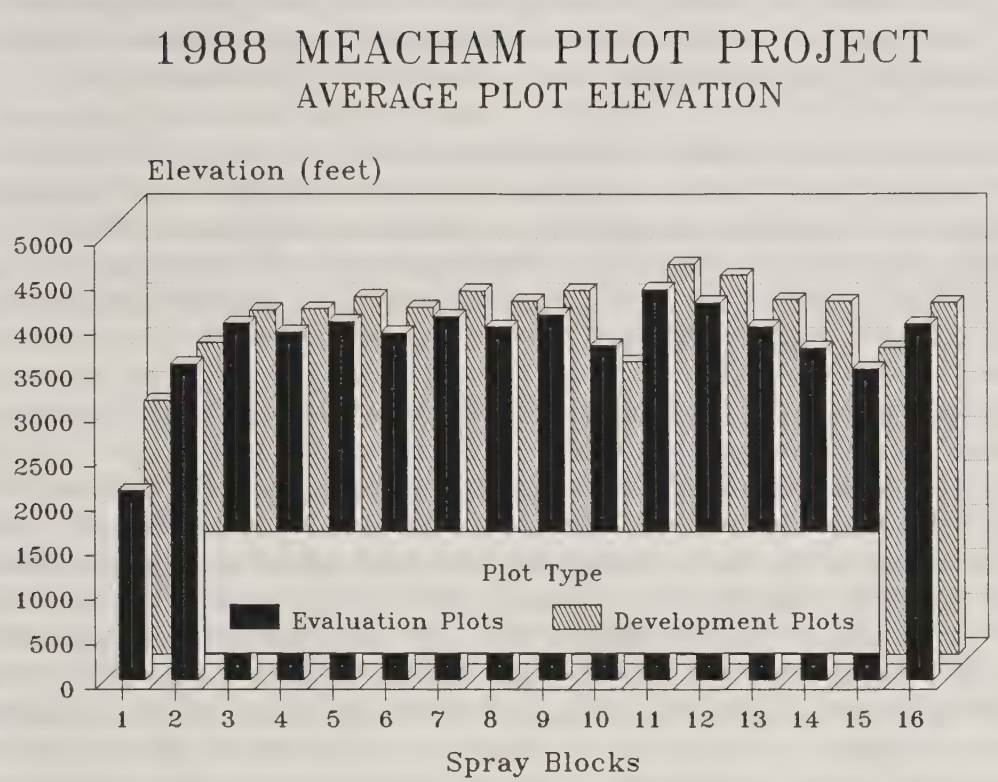


Figure 5.--Elevation of Meacham pilot project evaluation and development plots, Umatilla National Forest, 1988.

Once analysis units were qualified for treatment, budworm development sampling was initiated to monitor larval development and host phenology to time the release of blocks for treatment. Budworm development sampling was conducted on all three plots per operational block and on all 12 plots on pilot project blocks most of the time. Not all of the blocks were sampled daily because of time constraints and other sampling activities occurring simultaneous with development sampling.

Development sampling was performed by hand clipping one 45-cm branch tip from the lower crown of each of four trees per plot. Samples were collected from only Douglas-fir or true fir (primarily grand fir), depending on the host type present. In mixed species stands, two sample trees were of one species and two the other. A minimum of 25 budworm larvae were required in the sample. If this could not be achieved by sampling four branches, extra branches were taken until 25 larvae were obtained or a total of eight branches had been sampled.

After clipping the branch, counts were made of the total numbers of new shoots and unfurled shoots. Shoot data were recorded on a data sheet. The branch was then beat against the inside walls of a cardboard box positioned over a ground cloth to dislodge budworm and other larvae. The branch was carefully examined for any larvae which did not fall into the box after beating, and the total budworm and other larvae were recorded on the data sheet. Budworm larvae were separated into instars and the number in each instar was recorded. All data were either radioed to headquarters or brought in to be entered into the Data General computer and processed through the WESTBUDS program, or entered directly into a Husky Hunter field data recorder for transferring data files to the Data General at a later time for processing. As blocks neared release, the time required to obtain the data, enter it into the computer for analysis, and summarize the results for reporting at an 11:00 a.m. daily staff meeting became limiting. Hence, out of necessity, a program was written for the Husky Hunter to process data directly in the field. The Husky Hunter then permitted final development results to either be obtained by the Entomology Section Chief directly in the field or radioed to headquarters in time for the meeting.

Pilot project blocks were scheduled for pre-treatment sampling the day following block release. Pre-treatment samples were taken to determine density of budworm larvae in each pilot project block prior to treatment. These densities were used to compare with post-treatment densities to measure the amount of population reduction resulting from treatment. Samples were collected from opposite sides of the midcrown on each of three trees per plot using a pole pruner and catch basket. Each of the two branches were sampled and processed separately. The total number of new shoots on each branch were counted and recorded on a data sheet. Each branch was processed through a beating box in the same manner as development sampling. The total number of budworm and other associated larvae were recorded on the data sheet. All budworm larvae were then separated by instar and recorded accordingly. Branches were examined for remaining larvae after processing and before discarding each branch. Data were entered into the computer and processed through WESTBUDS.

Immediately following treatment, 45-cm branch samples were obtained from opposite sides of the midcrown of each plot tree on pilot project blocks. These samples were used to determine the amount of *B.t.* spray that was deposited on midcrown needles. These data will be correlated with post-treatment reduction of budworm and with defoliation. This work is being conducted by an independent cooperator and results were not available at the time this report was prepared. In addition, some of the foliage was bioassayed with laboratory-reared western spruce budworm larvae to determine if spray material

deposited on foliage contained any activity against budworm immediately after spraying. Branch samples collected for foliage deposit assessment were placed in paper bags and turned over to the cooperator for processing after eight or more new shoots had been removed for bioassay. The shoots for bioassay were placed in paper bags, labeled, and transported to the laboratory for bioassay. All foliage samples were placed in a portable walk-in tree cooler maintained at 40 degrees F until samples were processed. Foliage from each plot tree on a total of 20 plots was prepared for bioassay by removing any naturally occurring larvae from the new tips and placing the tips into 8 oz. plastic, disposable specimen containers until containers were one-half to three-fourths full. Ten, fourth instar laboratory-reared budworm larvae were then placed in each container to feed for a period of 7 days. At the end of the incubation period, foliage was removed from the containers and carefully searched for larvae. Counts of larvae were made and the numbers living and dead were recorded on data sheets. Each dead larva was prepared in a squash slide and examined with a phase-contrast microscope to determine cause of death. Diagnosis results were recorded on foliage bioassay data sheets, keyed into the computer, and analyzed with the WESTBUDS program.

Post-treatment evaluation sampling was scheduled on blocks when budworm began pupating. Each block was monitored in the same manner as development sampling to determine when pupation occurred. Post-treatment evaluation plots were sampled in a manner similar to pre-treatment sampling except that four midcrown branch tips were collected from each plot tree instead of two. Examination and processing of branch samples occurred in the field using the beating box method described earlier. In addition pheromone-baited sticky traps were placed over the analysis unit to estimate the amount of defoliation expected to occur on the Meacham analysis unit in 1989. The traps were collected approximately 30 days after placement.

Results and Discussion

Early Larval Density Sampling

To maintain the integrity of the pilot project, the Meacham AU was divided into two portions: the pilot project portion and the operationally treated portion. Each portion was then treated as separate AU's for the purpose of entomological sampling.

Results of early density sampling on both the pilot portion and operational portion of the analysis unit indicated western spruce budworm population densities high enough to qualify for treatment. The Meacham pilot project Entomological Sampling and Analysis Plan called for densities to average four larvae or more per 45-cm midcrown branch tip before the analysis unit could be treated. The pilot project area contained an average density of 14.2 +/- 1.3 budworm larvae per 45 cm branch (sample size = 47 three-tree plots). The percent standard error was 8.9, indicating that the estimate of the mean was fairly reliable; the measurement of uncertainty about the estimated mean represented less than 10 percent of the mean.

The estimate of budworm density was slightly less reliable than the sampling plan was designed to give. The sampling error was computed and the precision of our estimate of budworm density over the pilot blocks was 18.06 percent--about 3 percent more than was designed for in the sampling plan at the 95

percent probability level. The difference undoubtedly was due to using population data from other locations with different sample variance than represented by the Meacham population to develop the multistage sampling optimum allocation plan used on the pilot project. The precision of the density estimate is so close, however, that the difference over what was planned for by the design is negligible, representing no practical significance in the reliability of mean budworm density. The level at which the sampling plan was designed allows us to assume an acceptable amount of risk of incorrectly estimating budworm density which might lead to treating a population not needing treatment, or not treating one requiring treatment. Precision could be improved by either increasing the total number of plots, trees per plot, or branches per tree. The cost in terms of time of doing so, however, may not justify the relatively small gain in precision, and large gains in precision would have required substantially more sampling effort.

Populations were estimated on the operational blocks at an average of 5.6 +/ 0.9 larvae per 45 cm midcrown branch tip. The standard error represented a larger proportion of the mean (0.157) than on the pilot project analysis unit (0.089), where populations were higher and more uniformly distributed. The precision of the estimated mean was calculated at approximately 32 percent. The estimate of budworm population density on the operational portion was considerably less reliable than the pilot project area.

Based on this early larval density sampling, western spruce budworm populations were high enough on the Meacham analysis unit to cause visible defoliation and continued damage to Douglas-fir and grand fir host trees. Treatment of the Meacham analysis unit with *Bacillus thuringiensis* would benefit budworm host trees by limiting further defoliation and damage from budworm. Accordingly, on May 25, 1988, the Entomology Section Chief recommended to the Incident Commander that treatment proceed as planned on both the pilot project and operational areas. The Entomology section then commenced development sampling to time treatment block releases.

Development Sampling and Block Releases

Budworm and foliage development sampling were conducted simultaneously for pilot project and operational blocks. Graphs of the percent of budworm in the second and third instars, fifth and sixth instars, and percent of shoots unfurled were made each day for all blocks sampled, using Harvard Graphics software on a COMPAQ DESKPRO 386 computer. Development data were summarized in two ways. Charts were constructed to depict the daily development trend over all blocks sampled that day (Appendix A), and the development trend on each individual block over all days a particular block was sampled (Appendix B). Some of this information was distributed at the 11:00 a.m. daily staff meeting. All blocks were sampled with more or less regular frequency. During a number of days, however, cold temperatures and rainfall slowed insect and foliage development, and sampling was suspended until conditions improved (cf. Appendices A, B, and Figure 8 in Chapter 14).

The trend charts indicate sporadic development for some blocks over the course of time and more uniform development trends for others. The differences are believed to be mostly related to differences in sampling intensity between pilot project and operational blocks, and to the sampling errors associated with sampling populations of differing densities and distributions within and between trees, plots, and

blocks. In general, development trends seemed to jump around more on operational blocks where budworm populations were considerably lower and less uniformly distributed than pilot block populations. These aberrations in development trends made it difficult to forecast release dates for certain blocks.

According to the plan, blocks were to be released when less than 15 percent of the budworm were in second plus third instars, and when 95 percent of the shoots had unfurled. In all cases, releases were made using the budworm criterion as a minimum, and the foliage criterion provided only a rough guide. In many blocks where different host types were present, the grand firs were more advanced phenologically than the Douglas-fir. Reliance on the foliage criterion for timing releases proved frustrating in these circumstances. If releases were made too early, basing the timing on grand fir phenology, there would not be sufficient foliage available on Douglas-fir to intercept pesticide droplets and this host would go largely untreated. On the other hand, if we waited to release when the Douglas-fir met the unfurled criterion, the budworm would have quickly advanced to older, more voraciously feeding stages and consumed much of the foliage deposit surface before it could be treated. In addition, many of the slower developing buds on Douglas-fir would have been destroyed by budworm, or the newly flushed needles would have been defoliated before they could expand, if releases were delayed in an attempt to better coincide with Douglas-fir foliage development.

Decisions on when to release blocks were difficult to make by just relying on the guidelines provided in the Entomological Sampling and Analysis Plan. Once the percentage of budworm larvae reached less than 15 percent in the second and third stages, this information and its value in determining when to release blocks became less useful. To compensate for this, we began following the trends of the percent of budworm in the fifth and greater stages. This proved much more useful in providing meaningful data that could be evaluated and acted upon for releasing blocks. Releases based on the percentages of budworm in fifth and sixth instars were made in consideration of other factors as well, including status of foliage, degree of bud and foliage damage, population densities over the block, operational factors and limitations, release status of other blocks, and others. Block releases based on these criteria were made over a range of percentages of fifth and sixth instars from approximately 20-70 percent. Most releases seemed to be in the 40-50 percent fifth instar or greater range, however. This corresponded to the release criteria used during the 1987 Western Spruce Budworm Suppression Projects where blocks were released when 50 percent or more of the budworm were in the fifth or greater stages and 95 percent of the buds had unfurled (Scott, 1988).

The release date information shown in Table 2 indicates that the period of block releases ranged from June 13 through June 20. This shows that once the weather improved and temperatures warmed up (see Appendix C), budworm and host development advanced rapidly over the project area. All blocks were released within a 7-day period. The relatively uniform elevation of blocks over the analysis unit (Figure 5) also figures into the rapid and brief release period of all pilot project and operational blocks.

All blocks were treated promptly. Application never became protracted due to unfavorable weather or operational problems. None of the blocks had to be resampled or withdrawn for treatment.

Pre- and Post-treatment Sampling

Pre-treatment budworm density samples were taken the day following the date of release of each pilot block (Table 2). This timing of the pre-treatment sampling allowed plenty of time to accomplish this task while permitting the scheduling of other priorty work activities around it (e.g. development sampling, foliage deposit assessment and bioassay sampling).

Table 2.--Meacham Project block releases and pre- and post-treatment sampling schedule, Umatilla National Forest, 1988.

			Activity Date		
Block Number	Product	Released for Treatment	Pre-treatment Sampled	Application Completed	Post-treatment Sampled
M1XT	Thuricide	June 16	N/A	June 18	July 8
M2XD	Dipel	June 13	N/A	June 15	July 5
M3XT	Thuricide	June 15	NA/A	June 17	July 7
M4D	Dipel	June 15	June 16	June 17	July 8
M5T	Thuricide	June 18	June 19	June 20	July 10
M6C	Untreated	June 17	June 18	N/A	July 6
M7C	Untreated	June 17	June 18	N/A	July 7
M7XT	Thuricide	June 17	N/A	June 23	N/A 1/
M8T	Thuricide	June 18	June 19	June 20	July 11
M9D	Dipel	June 20	June 21	June 23	July 12
M10D	Dipel	June 16	June 17	June 18	July 9
M11XT	Thuricide	June 20	N/A	June 22	July 11
M12T	Thuricide	June 19	June 20	June 22	July 12
M13C	Untreated	June 19	June 20	N/A	July 6
M13XT	Thuricide	June 19	N/A	June 23	N/A 1/
M14XT	Thuricide	June 17	N/A	June 18	July 8
M15XD	Dipel	June 20	N/A	June 22	July 12
M16XD	Dipel	June 17	N/A	June 19	July 9

1/ Post-treatment sampling not conducted because this treatment was on a small portion of the Pilot Check block and used only to apply excess Thuricide product.

The results of pre- and post-treatment sampling are shown in Table 3. Pre-treatment densities were high, ranging from 11.6 to 23.2 on the pilot project blocks. Populations throughout the pilot project area were uniform. Only one block had midcrown densities less than 15.0 budworm per 45 cm midcrown branch tip. These high population levels provided for a good project of the efficacy of the two products because high pre-treatment densities allow for a greater chance of detecting real differences between pre- and post-treatment budworm levels. High pre-treatment densities permit a greater magnitude of population change from pre- to post-treatment sampling periods, giving a better measure of the ability of the project product to cause reduction in populations.

Table 3.--Pre- and Post-treatment densities on Meacham pilot project blocks, Umatilla National Forest, 1988. 1/

Block	Sample Size	Pre-treatment Density (Mean +/- SE)	Post-treatment 2/ Density (Mean +/- SE)	Treatment
4	300	19.6 +/- 1.9	3.5 +/- 0.5	Dipel 6AF
5	300	20.6 +/- 1.0	1.6 +/- 0.4	Thuricide 48LV
6	300	23.2 +/- 2.5	9.6 +/- 1.0	Untreated Control
7	300	17.2 +/- 1.1	8.6 +/- 0.8	Untreated Control
8	300	18.0 +/- 1.6	0.7 +/- 0.1	Thuricide 48LV
9	300	18.0 +/- 1.6	2.1 +/- 0.4	Dipel 6AF
10	300	15.8 +/- 1.2	0.9 +/- 0.2	Dipel 6AF
12	300	19.4 +/- 2.0	0.8 +/- 0.2	Thuricide 48LV
13	300	11.6 +/- 0.9	5.6 +/- 0.4	Untreated Control

1/ Densities expressed in budworm per 45-cm midcrown branch tip.

2/ Unadjusted for natural mortality

Results

Results presented at this time are based only on population reduction data collected during the 21-day post-treatment period. As our analysis continues, data from the post-treatment larval rearing will show a somewhat higher mortality rate and lower residual population. At this point, our results look very good.

The performance of the two *B.t.* products compared with the untreated check blocks are summarized in Table 4. Based on this information, it appears that Dipel 6AF reduced the population by 87.8 percent and Thuricide 48LV by 94.6 percent. Untreated control block densities also decreased due to natural mortality (parasitism, predation, etc.), but not by as much (54.2 percent reduction). When Abbott's formula (Abbott, 1925) was used to correct densities for natural mortality, population reductions for the two products came out 73.1 percent for Dipel and 88.3 percent for Thuricide.

Table 4.--Summary of treatment results on Meacham pilot project blocks, Umatilla National Forest, 1988. *1/*

Treatment	Pre-treatment Density (Mean +/- SE)	Post-treatment Density (Mean +/- SE)	Percent Reduction (Uncorrected for Natural Mortality)	Percentage Reduct. (Corrected by Abbott's Formula)
Dipel 6AF	17.8 +/- 0.9	2.17 +/- 0.2	87.8	73.1
Thuricide 48LV	19.3 +/- 0.9	1.0 +/- 0.2	94.6	88.3
Control	17.3 +/- 1.1	7.9 +/- 0.5	54.2	

1/ Densities expressed in budworm per 45-cm midcrown branch tip.

The population reductions resulting from both treatments were similar in terms of magnitude of change and slope when graphically displayed (Figure 6). Although the slopes of the two products were similar, they differed considerably from the control blocks. It is not yet known whether these differences are statistically significant, however.

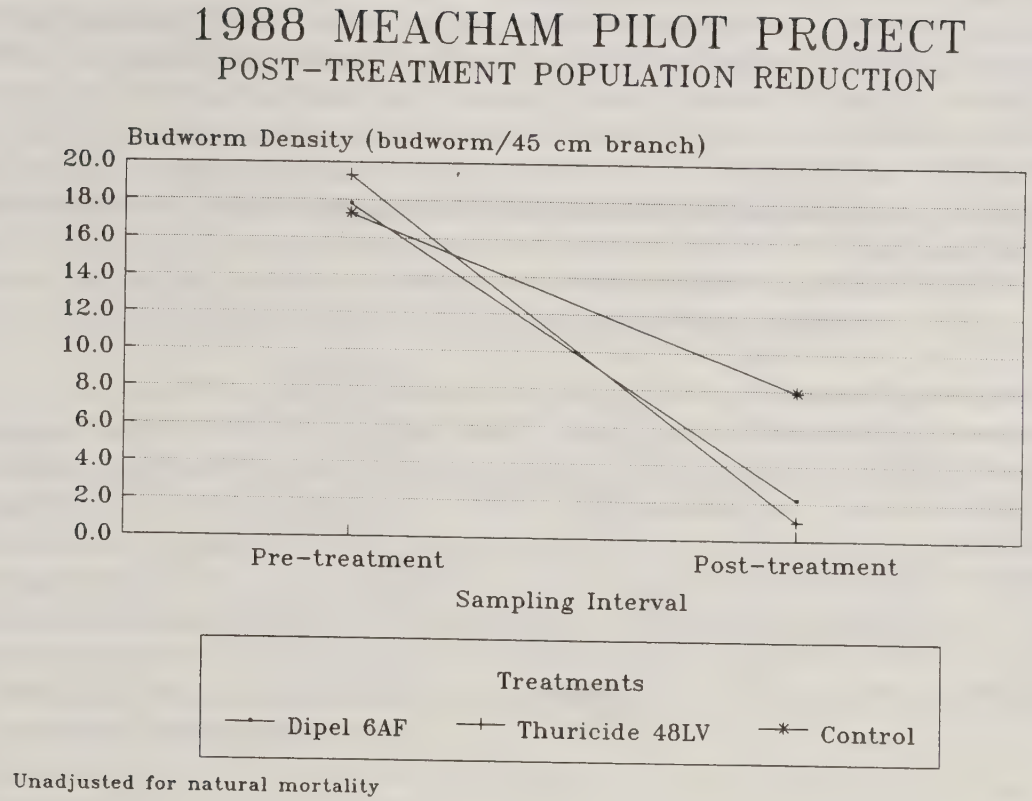


Figure 6.--Post-treatment budworm population reduction comparison, Meacham pilot project, Umatilla National Forest, 1988.

Of the two products, it appears that only Thuricide 48LV reduced budworm densities to a level of 1.0 budworm per 45 cm branch tip (Table 4). In order to be successful from a population reduction standpoint on operational suppression projects in the Pacific Northwest Region (Region 6), pesticide products must be able to achieve post-treatment population reductions of less than 1.0 budworm per 45 cm branch tip. Compared to this standard, Thuricide 48LV marginally achieved acceptable budworm population reductions and Dipel 6AF did not.

Results from treatment on operational blocks are shown in Table 5. The treatment of operational blocks on the Meacham Budworm Project resulted in an average post-treatment density for the area of 1.62 +/ 0.28 budworm per 45 cm midcrown branch tip. Certain blocks show poor results and may be due to poor application on the difficult-to-treat, steep-sloped, stringer-type timbered portions of the blocks.

In one case (block 11), the only access to the block for establishing evaluation plots was along one road which formed the boundary between this block and an adjacent pilot project block. In all probability, these plots were poorly treated or missed altogether, given their close proximately to the adjacent pilot block.

Table 5.--Post-treatment densities on Meacham Project operational blocks, Umatilla National Forest, 1988. *1/*

Block	Sample Size	Post-treatment Density (Mean +/- SE)	Treatment
1	30	0.87 +/- 0.82	Thuricide 48LV
2	24	0.92 +/- 0.48	Dipel 6AF
3	60	2.80 +/- 0.50	Thuricide 48LV
11	24	3.37 +/- 1.59	Thuricide 48LV
14	24	0.50 +/- 0.22	Thuricide 48LV
15	30	0.50 +/- 0.10	Dipel 6AF
16	42	1.33 +/- 0.18	Dipel 6AF
analysis unit Mean		1.62 +/- 0.28	

1/ Densities expressed in budworm per 45 cm midcrown branch tip.

The two products were applied on both pilot project and operational blocks at 42.7 ounces per acre under operational conditions, which is less than the volume applied on other operational suppression projects in 1988 (i.e., 64 ounces per acre). It may be that this volume is at the limit of achieving adequate coverage with droplets having sufficient potency to reduce budworm densities to acceptable levels when populations are relatively high, like those of the Meacham AU. Both products may perform better against lower population densities, although this is not known. Furthermore, application conditions and terrain in the West are different than in the Northeast where good results have been achieved using ultra-low volume applications of high potency *B.t.* products. Western slopes heat up rapidly and the steepness and varying aspects make them more difficult to achieve uniform depositions of aerially applied insecticides. It is not surprising that western results might be different.

Although results are marginally acceptable, the value of using undiluted *B.t.* products to reduce application costs may offset the relatively minor differences in efficacy between these products and applications using higher volumes in diluted or undiluted form. Given the results from this pilot project, treatment of high budworm densities (e.g., 15.0 or more budworm per 45 cm branch) with Thuricide 48LV or Dipel 6AF undiluted at 42.7 ounces per acre will result in population reductions with average residual densities of probably 1.0 budworm per 45 cm branch or greater. Lower reductions may be possible with lower initial budworm population levels. These treatments would provide another western spruce budworm treatment alternative if managers are willing to accept somewhat greater risk of budworm resurgence or light damage to the resource associated with higher post-treatment population levels than traditionally targeted.

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CHAPTER 11

PATHLINK

During the Meacham western spruce budworm pilot project on the Umatilla National Forest, adjacent Umatilla Indian Reservation and private land, the operational use of a Pathlink recorder and analysis equipment was carried out to determine the system's practical applicability on an aerial application spray project. The following information is a response to the project plan to summarize results before and during the project. A detailed Pathlink report will be written later.

Objectives

1. To determine if Pathlink recorders can be installed in helicopter aircraft to provide information generated from Pathlink recorder functions (flight path, radar altimeter, analog channels). If not, to what limitations.

a. The Pathlink can be installed in helicopter spray aircraft. Several hours of preproject time was required to insure that all systems were working properly prior to the first spray day. The USDA Forest Service in Region 6 was the first agency to attempt the use of Pathlink in rotory aircraft during an aerial spray project. Due to the sensitivity of Pathlink's LORAN receiver, several problems can result if the aircraft does not have a LORAN navigational device. Small helicopters like the Hiller Soloy used during the project are not flown point to point, but rather work in a small area and do not require a navigational device such as a LORAN. Major engineering efforts are still required to overcome the electrical noise problem on this type of helicopter. Therefore when installing the Pathlink, all electrical aspects of avionics, generators, grounds, and battery power supply must be considered. The Hiller Soloy is a small aircraft with a small ground frame carrying a lot of electrical noise that disturbs the LORAN reception. In addition, the use of Beecomist rotary atomizers powered by high RPM electric motors causes cycle jumps in the entire aircraft's electrical system and in turn disturbs the LORAN reception.

Between the Hiller Soloy's electrically noisy frame and the Beecomist motors, the LORAN reception for recording the flight path becomes so disrupted that no useful recording could be made. Even though the other Pathlink functions were recording adequately the flight path is the primary information to be recorded causing the Pathlink system to appear to be of limited use during this project. The Pathlink system can be used operationally in any aircraft that has shown to properly use a LORAN navigational device. The effects of Beecomist motors on the LORAN in other aircraft is not yet known.

b. The radar (radio) altimeter was operational during the entire evaluation. The altitude above the ground was recorded each time a flight was recorded. Some work is still required to change the flight data column for altitude to actual altitude rather than dealing with a number that needs to be converted with an offset and a multiple factor. This can be done with a simple software program. It appeared that the radio signal used was bouncing off the ground, not off tree crowns. Still this altitude should be considered more in terms of the general high and low distance above ground during boom on time. Although the altitude above the ground can be measured within 5 to 10 feet, a more reasonable measurement would be about 40 to 50 feet. The radar altimeter is not effective when the aircraft turns more than 30 degrees away from perpendicular to the ground. But this should be when the aircraft's boom is off and not a factor. Varying terrain should also be considered as well as extremely steep slopes.

c. The analog channels recording the boom pressure, the flow rate and when the boom was on or off all recorded well.

1) The boom pressure was recorded accurately and could be measured within about .5 pounds. When the spray system had problems and the pressure could not be turned off to less than 9 pounds, it was measured accurately by the Pathlink. Pressure was measured by using an extension tube running from the boom about five feet to where a pressure sensor was attached to the end of the tube. The pressure was accurately measured but there was a slight delay in the reading.

2) The flow rate was measure directly at the flow meter or crop hawk. The flow rate measurement is determined by actually measuring the number of electrical pulses as the flow meter rotates. This number needs further calibration. The flow rate varies with the viscosity of the material passing through the crop hawk. It was determined for water, but not for the insecticide used on the project.

3) The boom on and off switch worked well enough to sense whenever there was pressure in the boom to allow spraying. This is a simple binary switch that is either activated or not activated. But when the spray system had problems and there was a constant pressure of 9 or 10 pounds, this binary switch was activated even though the pilot was not spraying. This switch may more accurately capture actual spraying time by being connected to some other part of the spray system. But connecting it to the Beecomist motors is not good because the pilots usually leave the Beecomist motors on in the turns between passes.

2. To determine if the Pathlink recorder system is operational for spray helicopters.

The Pathlink system is not operational for Hiller UH-12 series. It is likely to not be operational in other small helicopters like Lama SA 315B and the Bell 47G-3B-2A because of similar size and noise problems. Larger spray helicopter and fixed-wing spray aircraft that have already installed LORAN receivers should be operational. Further use of the Pathlink system on the more common type spray aircraft would be worth the effort.

3. Is the resolution of information recorded precise enough to be considered a quality control device?

When a Pathlink recorder is recording operationally, as it was intended, it can be used as a quality control device. But not during the 1988 Meacham project. Pathlink can accurately record area treated, altitude above ground during application, the application rate measured by pressure and flow rate, and spray time. Additional work is still required to fine tune this recorded data for actual contract administration use. At this time, aerial obserrvers and measured gallons pumped into aircraft are still the best tools. But because the LORAN could not operate adequately due to electrical interference, the Pathlink could not be used to record a pilot's performance (swath width, spraying within a block, altitude and booms on in a turn).

Since flow rate calibration is still required, a comparison between gallons pumped into the spray aircraft and gallons sprayed by using the flow rate recorded by the Pathlink has not yet been determined. Additional work is still needed to come up with actual gallons pumped out of the spray system from recording the pressure and the flow rate measurements.

This flight record can be a good learning tool for both aerial observers and spray pilots, but not in 1988. It has also been shown to be a source of performance competition between spray pilots when the Pathlink can accurately display flight paths within a spray block. The Pathlink has the ability to become a substitute for the aerial observer when all of its systems function properly. This would offer a substantial dollar savings in the future, but only if the LORAN reception problems can be resolved in other types of aircraft.

4. Baseline of time spent working with the Pathlink system.

The following time is for only the primary user of the Pathlink system, the "Pathlink Coordinator".

a. Training
   1) Classroom
      a) 16 hours - Pathlink System and Basic Electronic Navigation course taught by the president of Pathcor

      b) 16 hours - At Pathcor corporate headquarters with their electrical engineer.

b. Demonstrations
   8 hours - Demonstration of Forest Pest Management's specially designed Pathlink for use on the spray project by Pathcor representatives in Tempe, Arizona showing the functions recording while in flight.

c. Practice
   8 hours - Using the Spotlink operationally to fully understand its functions applicable to possible spray project use.

d. Pathlink recorder system hardware installation into the Hiller Soloy at Western Helicopter Services in Newberg, Oregon.
   1) Western Helicopter employees time unknown. An estimate would be approximately 12 to 18 hours.

   2) 30 to 40 hours actual time spent by the Pathlink coordinator in working toward getting the Pathlink system operational in the Hiller. Much of this was due to an electrical short in the coax cable from the antenna to the recorder and a trip to the II Morrow factory in Salem.

e. Pathlink analyzer set up time
   50 - 60 hours of actual time spent for just the Pathlink coordinator. This does not include all the time spent by the project plans chief or Regional computer personnel or the time on the phone seeking possible solutions to the following problems.

   1) The project's plotter used by plans with a Compaq 386 Desktop Pro was not compatible with the Pathcor software package to plot flight paths. This was resolved later when a duplicate connecting cable was figured and made up by the Management Systems representatives in the Regional Office.

2) The project plans Compaq 386 Desktop Pro had been built up to handle extra memory with the use of additonal hard drives. The Pathcor software was designed to run on "C" drive, but project programmers had placed it on the "E" drive. Not only could it not process export data but it did not allow for regions (spray block overlays for flight displays) to be created causing many hours of work in attempts to use and correct the problem. Once all Pathlink work was confined to the portable Compaq 386 and Pathcor sent the Pathlink coordinator their plotter to be used during the project, these problems were solved.

f. Pathlink mapping
24 to 32 hours of actual time spent developing spray blocks.

1) Draw spray block boundaries on 7 1/2 minute USGS topography maps. No use of Pathlink was done by recording flight paths around spray block boundaries made by an observer ship. None was ever installed in an observer ship during the project. However, using maps and determining latitude and longitude points of each spray block is definitely the most economical method of recording spray block boundaries. All latitude/longitude map work to create spray block boundaries was done with a Numonic Digitizer that accurately measures points to the nearest 1/60th of a minute. This must be changed into 1/100th for input into the Pathlink system.

2) Entering spray block latitude and longitude descriptions into the computer took a lot of extra hours because of the problems with using the Pathcor software on the "E" drive. Once all data entry was done only on the portable analyzer, the problems were eliminated and all data entry went well.

g. Additional trouble shooting
Approximately 40 hours, sometimes with Pathcor representatives.

h. Purchasing and payment processing
Approximately 30 hours. This time amount is largely due to attempts of trying to track down previous purchase orders, nonpayments of purchases by NFC because of the lack of processing purchase orders. Basically, government suppliers were quick to supply products, but were not being paid on time.

i. Since this was the first time for the Pathlink Coordinator to use the Pathlink system, a lot of effort was spent trying to make aspects operational when there were unknowns about whether it was the system, the equipment, the installation, or the user that was causing the problems. More efficient use of the Pathlink in the future can be made now that the Pathlink Coordinator has experience on just what to expect.

5. **Accounting for actual performance of the Pathlink system**
Much has already been said about the actual performance of the Pathlink system in this report. The following is a short summary.

a. Which capabilities are operational?
The radar altimeter, the pressure sensor, the boom on and off sensor, and all current Pathcor software.

b. Which capabilities need improvement?

The LORAN reception needs to be checked out in each specific aircraft that the Pathlink is designated to be installed prior to the project. Once it is determined there is good LORAN reception the Pathlink flight recording will work operationally. The flow meter recording needs to be calibrated for specific materials being sprayed. The data recorded in the software program using the HEX numbering system has been improved by Pathcor using their export software package. This data needs further refinement into specific number that can then be imported into such software programs as Harvard Graphics for visual displays and record keeping. Summary reports still need improvement.

c. What are the limitations of the system.

The actual installation into a specific aircraft takes a lot of time prior to a project to insure that all systems are working or will work. From what was learned on this project, better results in this area is expected. The Pathlink flight recording again is only as good as the low frequency LORAN reception. Another limitation is that the Pathlink system is still relatively new to the Forest Service and each time it is used it becomes a learning experience. The system is integrally connected to the aircraft and it is not just a simple plug-in procedure to make the recorder operational. Once all connections are complete, the daily use of the recorder does become just a simple plug-in. The only major limitation is the type of aircraft into which it can be installed to work properly. It is recommended that 2 to 3 months prior to a contractors' start work date, the Pathlink should be tested in the specific aircraft that will do the spraying.

d. Which capabilities offer the most benefit?

1) **Recorded data:** The flight path display is still the most important. The other recorded data is very beneficial and can be used operationally, but still needs work.

2) **Graphic displays:** The po10tial graphic displays were not explored due to the actual short project time (10 days). Time was spent attempting to resolve other problems and graphic software packages were not used during the project. These displays are very much possible with additional efforts spent specifically for the development of such products.

3) **Summary reports:** Pathcor software package generates a summary report of each flight recording. On this project it was using primarily to explain the poor results of the flight recordings. Other summary reports can be generated from the recordings of the Pathlink, but it takes development time.

General Use of Pathlink

1. Installation of equipment

a. Installation is much more than just plugging in a Pathlink. It requires:

1) Proper mounting of a LORAN antenna.

2) Proper mounting of a radar (radio) antenna out of the way of the spray system.

3) Proper hookup of sensors to the spray system including boom pressure, flow rate at the crop hawk and spray system on or off.

4) Proper power source with adequate electrical grounds and attachments to eliminate electrical disturbances.

5) Use of necessary transducers to reduce electrical noise.

6) Knowledge of aircraft regulations, spray systems, electronics and avionics.

b. Proper installation of the Pathlink recorder and necessary wiring requires expertise in avionics and electronics. During this project, the Pathlink coordinator relied on the goodwill of Western Helicopter's chief mechanic, the II Morrow Corporation's engineers and Pathcor engineers for assistance. The Pathlink coordinator does not have the expertise in these areas to accomplish proper installation.

c. To insure effective use of Pathlink on a project it is important to consider who actually is responsible for proper installation. Should it be:

1) The aerial spraying contractor whose aircraft will carry the Pathlink recorder? These contractors are not motivated to put a recorder in their aircraft, don't feel they need it or want it. Pilots don't like the additional 35 pounds in the cockpit and they can be intimidated when a recorder is present. Asking a spray contractor to install an electronic monitoring device, and with the Forest Service relying on the contractor for proper installation, success of the Pathlink system will be dependent upon the good will of the contractor.

2) The Forest Service, who does not have personnel adequately trained to do the installation and necessary engineering to adapt the system to each type of aircraft that may be used on a project? Once the system is operational, Forest Service personnel can adequately use the system.

3) A Pathcor company representative contracted to do the installation prior to the start of the project? They have designed the recorder and have the expertise to adapt the system to most aircraft.

4) Some other contractor who is independent of the other and can work with the spray contractor prior to the start work day to insure that the system is operational? This would take a lot of of lead time and the type of aircraft would need to be known for the bidding process.

2. General use

a. It is important to have a Pathlink coordinator trained in the use of MS DOS to help in using the Pathcor software package. Pathcor considers MS DOS basic computer language of the every day user. Several other spray technology software adaptations require knowledge of MS DOS today.

b. Pathcor is willing to train users of Pathlink recorders. Good training is important to eliminate the learning curve problems that can reduce the effective use of the Pathlink system since the use window is very narrow.

c. A Numonic Digitizer will save many hours of time when creating spray blocks, mapping sensitive areas, heliports, and hazards. Without this type of machine, the work must all be done by hand.

d. Data processing of Pathlink recordings did have problems on the Meacham project, but most all problems were resolved.

3. Future use

a. Besides the basic flight recording, the other information to be recorded during spraying can be used, but much work is yet to be done to process the information to use it operationally in contracting. Continued use of Pathlink by the Forest Service is necessary.

b. Pathcor engineers working with the Forest Service have further development work to do. The effect of Beecomist and Micronair rotary atomizer electric motors on the LORAN is still unknown. Studies in this area should be done prior to any operational preparation for a future project. Any first time effort with the type of technology requires a lot of work.

c. The potential for using the Pathlink system is good, but a commitment to work with Pathcor is necessary.

4. The "Pathcor Company"

The Pathcor president, engineer and other staff were extremely helpful during the entire 4-month period. Their prompt response to equipment orders, their development of a software package specific for Forest Service use, their hours of assistance over the phone and their on site visits to assist the Pathlink coordinator and other Forest Service support staff demonstrated a superior support attitude for users of their products. Their help was very much appreciated by the Pathlink coordinator.

CHAPTER 12

MONITORING

Environmental monitoring on the Meacham Spruce Budworm Spray Project consisted of locating and monitoring the movements of elk before and during spray operations (no water monitoring was done). The Confederated Tribe of the Umatilla Indian Reservation expressed a concern that spray operations may adversely impact elk because the projected time of spraying coincided with the peak of the elk calving season. The opportunity to monitor the movement of elk was available because the Bureau of Indian Affairs and the Oregon Department of Fish and Wildlife had cooperatively put radio collars on several animals in the winter of 1987 for the purpose of monitoring their movements during the next 3 years.

Three radio-collared elk were located within the spray project area in April after migrating from the winter range on the Reservation. The elk are routinely located every 2 to 3 weeks with a fixed-wing aircraft equipped with a receiver after which the locations are plotted on a map. Flights are made to "track" the movement of each radio-collared animal, thereby establishing a home range for each animal.

Enclosed is a map (Figure 7) that shows the locations of the three radio-collared elk that were found on the project area at various times throughout the life of the spray project. Each animal is identified by the last three numbers of the radio transmitter frequency. All of the radio-collared elk located within the project area were cows.

After each radio-collared elk was located the second time from the air, an attempt was made to locate them from the ground using a hand-held receiver by an employee from the Walla Walla Ranger District. Only one of the three (#461) was easily located and, consequently the decision was made to continue monitoring only the one elk from the ground and monitor the other two (#751 and #815) from the air.

The location monitoring of the radio-collared elk before, during, and after the spray project indicated the elk were not displaced from the project area. Elk #461 was originally located in the vicinity of the Meacham airstrip and remained within 1 mile of the airstrip the entire time. The airstrip was used as the main helibase for spray operations, plus the entomology crews did sampling in the area throughout the life of the project. The plan was to monitor the movement of elk #461 from the ground on the day spraying was being done in the vicinity of the Meacham airstrip. Unfortunately she was in a control block adjacent to the spray block on the day the area was sprayed.

Actions of elk during actual spray operations were discussed with several of the aerial observers and helicopter pilots. The concensus was that following a low-level pass with a helicopter, elk observed in openings tended to drift towards the cover adjacent to the opening. None of these folks ever observed any elk running hard attempting to elude the approaching aircraft.

Our monitoring concluded that the spray operations and associated activities had very little, if any, adverse impact on elk within the project area and did not cause them to leave the area.

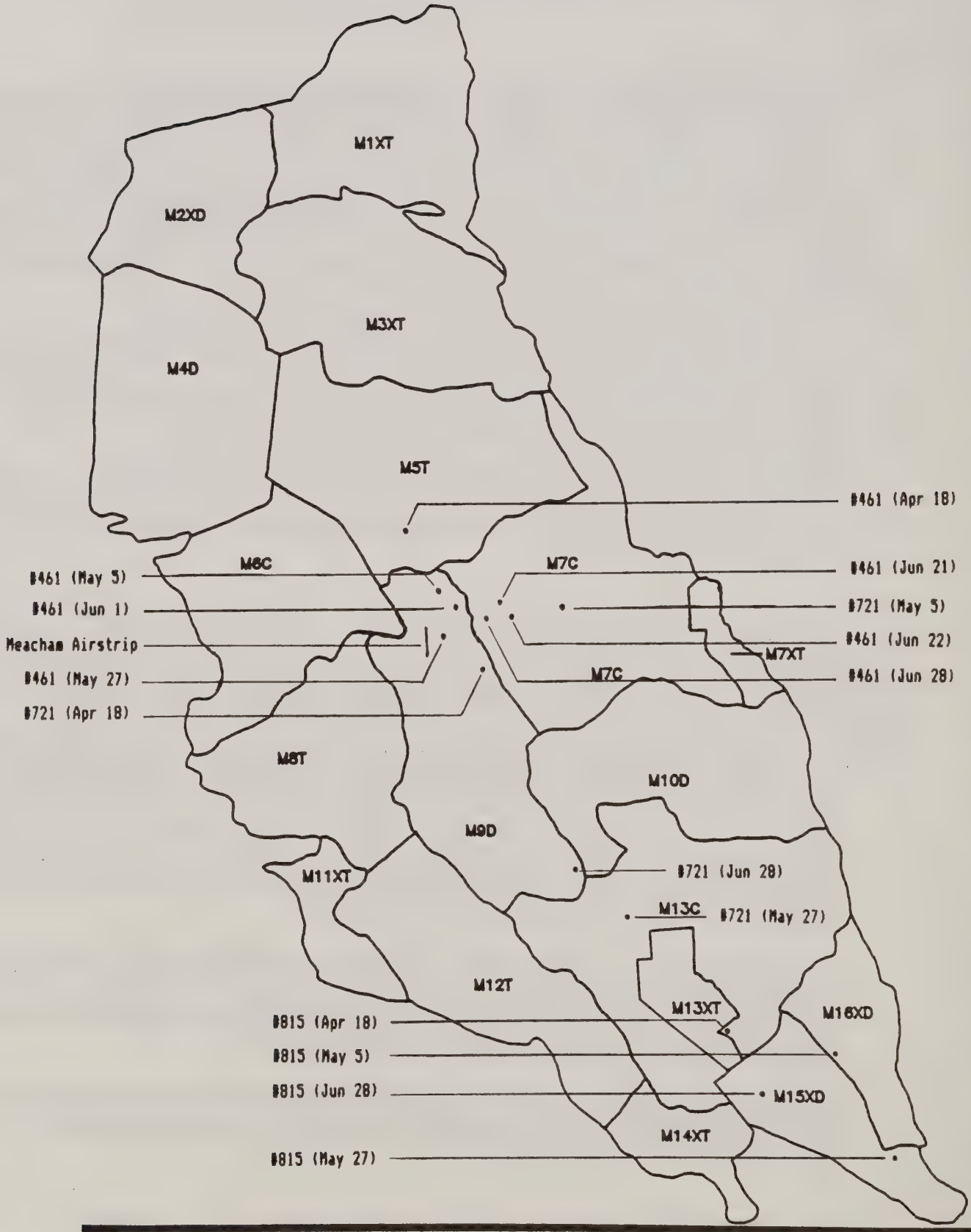


Figure 7. Radio collared elk locations during the 1988 Meacham Pilot Project.

CHAPTER 13

SPRAY DEPOSIT

Krome-Kote deposit cards were used to provide feedback during spray operations to check drift, swath widths, drop size, spray behavior, etc. No attempt was made to associate card data with insect mortality at the sampling points. Rather, through an agreement with the Research and Productivity Council (RPC) from Fredericton, New Brunswick, spray deposit was measured on host-tree foliage collected from the same sample plots and trees used to measure budworm population density. To facilitate counting, a red dye was added to the spray mix. Within a few hours following treatment, branch samples were collected from the evaluation plot trees and returned to the laboratory for counting. Individual needles were removed from the twig and placed between cellophane tape. Spray deposit spots were counted on each needle with the aid of a binocular microscope. Subsamples of all needles were also examined using ultriviolet lights to count and size the drops. The results of the deposit assessment work will be reported by RPC and used for a detailed evaluation for deposit versus budworm mortality. These results will be reported at a later time.

CHAPTER 14

METEOROLOGY

A low pressure trough along the Northwest coast brought cool, wet weather through June 8. During the period May 28 through June 8, the automatic weather station at Meacham received measurable rainfall every day except June 2. Total rainfall during that period was 2.13 inches (Figure 8).

The trough eventually weakened and moved to the northeast on June 11/12. Starting on June 13, high pressure built over the western U.S. as another upper trough approached the coast. However, this system formed an upper closed low off the California coast by June 15. This pattern of a strong upper ridge along the Rockies and an upper low off California persisted through June 24.

During the spray period (June14 through 24), early morning temperatures were generally in the low to mid-40's with relative humidity readings between 60 and 80 percent. The only weather problems were RH values nearing 50 percent on ridges on a couple of mornings. The only rainfall was .14 which fell from a thunderstorm on the night of June 16.

Forecasts

From June 7 through June 10, general weather outlooks were issued for the next 5-day period. On June 13, specific block spray forecasts were issued daily around 1300 for the following day. These forecasts contained a discussion, weather forecast, specific hourly temp/RH/wind forecasts for 0400-1200 PDT, aviation weather forecast, and outlooks for days 2 through 5. The last routine forecast was issued June 22.

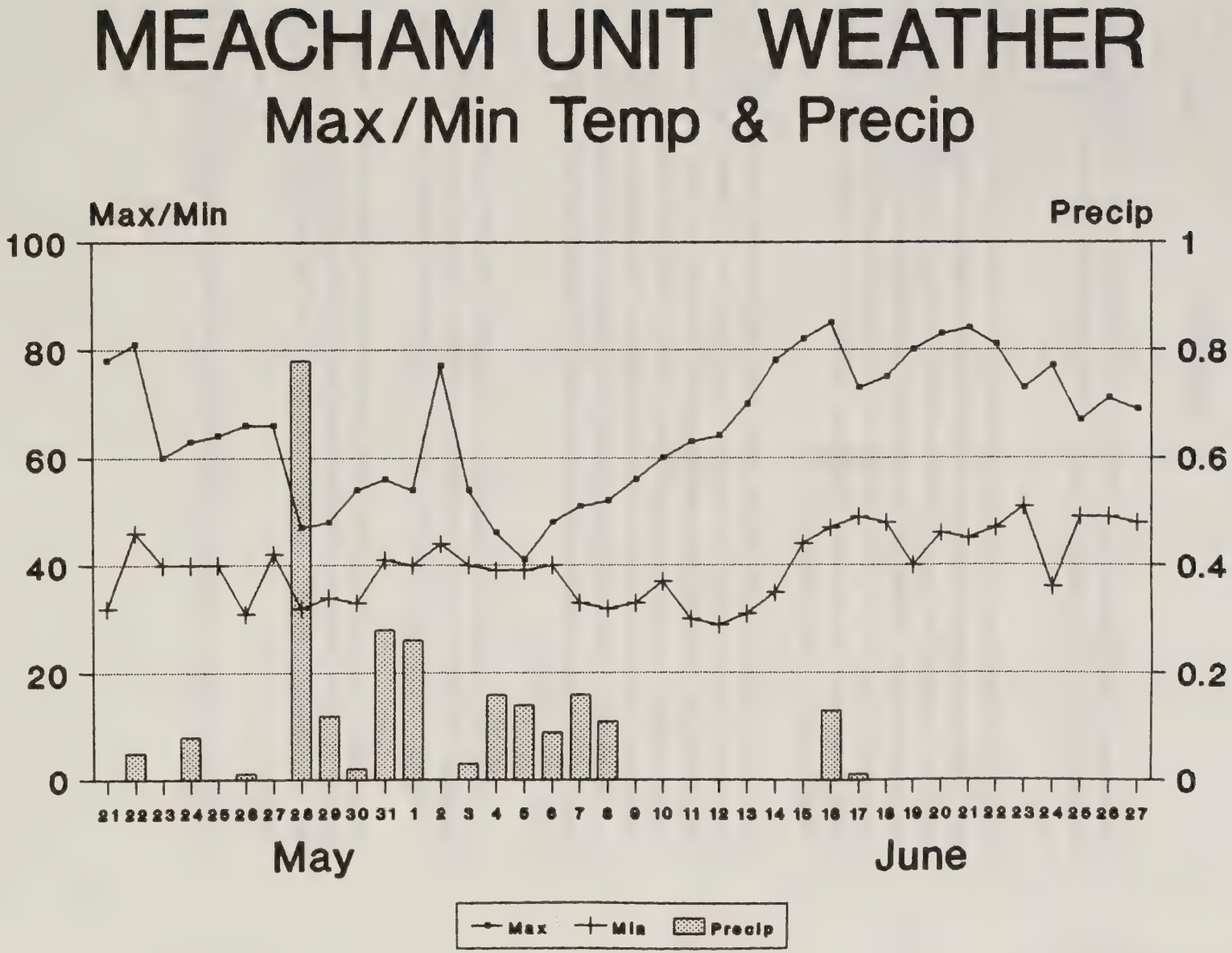


Figure 8. Daily Max./Min temperature and precipitation at Meacham, Oregon during late May and early June 1988.

CHAPTER 15

LOGISTICS

The logistics function started with a meeting in Portland to identify project supplies, materials, and equipment. A trip to the project site followed and resulted in the selection of the project headquarters site.

Necessary supplies were ordered with sufficient time for delivery prior to project start. As required by FPR, GSA was the prime source for the majority of office supplies and various consumables, BIFC and Redmond fire cache were used to obtain all items that they had available--mostly for the operations phase of the project. Purchase orders and other formal procurement methods were used as needed. The project utilized the host forest imprest fund and blanket purchase agreement for local purchase items. Immediately after start-up of the project, contact was made with Tollgate and The Dalles units which resulted in mutal sharing of items.

Of note was the leasing of the vehicles. The project "piggy-backed" a current contract that the Wallowa-Whitman NF was putting out. This resulted in obtaining a fleet comprised mostly of new vehicles. With new vehicles, the normally expected "down time" from GSA, or green fleet vehicles, was kept to a minimum with the exception of two vehicles out of service for a total of 5 days. For this reason, we were able to keep vehicle numbers to an absolute minimum. Fortunately, we received (at lessor's charge) many more 4x4's than we had expected. With road conditions in the project area being marginal, without the 4x4's, the job could not have been accomplished. This issue must be addressed for the next project scheduled in this area.

The radio systems were somewhat less than we wanted. One entire system had to be exchanged. For the safety of the field crews and the daily prosecution of the work, the radio systems must be capable of working at all times. More attention must be put to communication prior to the start-up.

The Logistics crew (chief, supply unit leader, and procurement) started work 1 week prior to anyone else. This resulted in the project headquarters being ready to occupy with only minor work for the Operations and Entomology staffs. It is strongly recommend that this become standard procedure for future projects.

All supplies, equipment, materials, and vehicles were on site at time needed and in quantities necessary.

Facilities and equipment summary:

Building	
Floor space	8,400 sq. ft
Decks	18
Tables (assort.)	36
File cabinets	10
Chairs (desk)	28
Chairs (stacking)	60
Rearing racks	3
Telephones	8
Storage shelves	12
Flammable storage cabinet	1
Lab lights (assort)	36
Microscopes	4
Vehicles	
2x4 pickups	17
2x4 vans	2
4x4 pickups	23
Cold Storage	
Refrigerators	2
Freezer	1
Cooler 8' x 14'	1
Radios	
Repeaters	2
Remotes	2
Hand helds	96
Computers	
Data General terminals	3
Data General printer	1
PC clones	3
Digitizer (2' x 3')	1
Field data recorders	10

CHAPTER 16

FINANCE

The finance function was not as smooth as logistics. Time and attendance and tour-of-duty problems surfaced in the form of Sunday/night differential and how to pay certain classifications of employees. These two subjects seemed to occupy a great deal of our time and at the time this is written, they are not fully resolved.

Daily costs were computed and continually refined to provide better estimates of money spent.

The management code for the project MUST be established, i.e., budget host forest, in a more timely manner. This is imperative! We worked with a "temporary" reimbursible management code until the first of June (+-). This required us to make many accounting adjustments, a time-consuming process.

Cost-saving opportunities the project took advantage of include:

1. Reduction of original vehicle fleet
   some vehicles went to the Tollgate project
   some vehicles were returned to lessor prior to transportation to Pendleton

   As noted in the Logistics Report, the use of new vehicles instead of used GSA or green fleet vehicles, reduced repair costs and loss of use--a definite savings.

2. Reduction (temporary) of Operations staff during adverse weather.
   15 employees returned to official duty stations for 5-6 days.

3. The composition of the Logistics/Finance section was such that three positions were "dual-hatted" to save the need for three detailers: ground support and supply, timekeeper and cost, procurement and clerk. This seemed to work very well and saved an estimated $8,000.00.

As per instruction of the Incident Commander, and in keeping with good fiscal management, every opportunity to save dollars was taken.

Cost-saving opportunities for future projects

1. Consider hiring temporary employees as intermittent instead of full-time temporary.

Other considerations for future projects

1. Reconsider use of 1st 40 tour of duty, especially for biology aides. This may stop the T&A problem.

CHAPTER 17

LIAISON

Liaison and coordination was an important part of the Meacham Pilot Spray Project because the project area included more private land than public land. Another 41,240 acres of private land were sprayed, which was 71 percent of the total acreage sprayed. A total of 4,529 acres of land on the Confederated Tribes of the Umatilla Indian Reservation were also included in this project. The majority of the private land sprayed is owned by three entities--Boise Cascade Corporation, Louisiana Pacific Corporation, and Cunningham Sheep Company. The remainder of the private land in the project area is owned by a total of 262 separate landowners. Enclosed is a chart that displays the ownership of all the lands that were sprayed in the project area (see Chapter 6).

Given the amount of private land in the project area, it was a major undertaking to contact each landowner to obtain permission to include their property in the project. Cooperative Agreements were developed with Boise Cascade Corporation, Louisiana Pacific Corporation and Cunningham Sheep Company for the purpose of including and using their lands. A resolution was passed by the Board of Trustees of the Confederated Tribes of the Umatilla Indian Reservation authorizing the inclusion of Tribal Lands in the spray project. The remaining private landowners were each sent a letter requesting permission for the Forest Service to include their property in the spray project.

The process of contacting all the "small" private landowners (those other than the cooperators--BCC, LP, CTUIR, and Cunningham Sheep) was a cooperative effort between the Forest Service and Oregon State Department of Forestry. Addresses of the landowners were obtained from the respective County tax role and the first mailing was made in February requesting they be returned to the State Forestry office in La Grande. Letters were returned by all but approximately 35 landowners by the end of March. Reminder letters were mailed out in April to the non-responders of the first letter. All property owners were contacted by the end of May except for three whose letters were returned undeliverable by the Postal Service.

Initially, all landowners consented to include their property in the spray project except for 11 who did not give permission or requested more information. Each of the these were personally contacted and were provided additional information about the project. Ten of the 11 landowners contacted consented to include their property as a result of the personal contact. Therefore, only four parcels totaling 168.5 acres were excluded from the project, three because the landowners could not be contacted and one because permission was denied. The landowner that denied permission was an absentee landowner from Tennessee, whom we were unable to contact.

The main helibase was located at the Meacham airstrip which is on property that is owned by Cunningham Sheep Company. The main helibase was the hub of activity during spray operations and consequently required additional coordination with Cunningham Sheep Company. Western Helicopter Company worked with Cunningham Sheep Company for permission to use the airstrip, store the insecticide, locate an on-site caretaker, and install a cattleguard in place of a gate on the access road to the airstrip. All parties worked well together resulting in a good operation. One minor problem occurred when a truck delivering a load of insecticide broke through a small bridge on the access road to the airstrip and storage site. The bridge was repaired the same day to the satisfaction of Cunningham Sheep Company.

Other coordination was required with a landowner who had locked gates on two access roads to and through his property. He was contacted and permission was granted to put Forest Service locks on the gates throughout the life of the project.

Immigrant State Park was the only major area of public concentration that was planned for spraying. Consequently, the State Park's manager and crews were informed about the spray operations. We also agreed that on the day before spraying of the State Park, park officials would be notified and public notification signs would be posted in the Park. Park rangers were also given informative literature to give to every camper in the campground. The rangers working at the check-in booth also informed every prospective guest that the Park would be sprayed early the following morning. Park officials indicated later that numerous people chose not to stay because of the spray operations. The Park was approximately 60 percent occupied the night before spraying, which was 25 percent below what was normal for that date and day of the week. Several of the guests were visited in the Park the morning after spraying and none of the people contacted were alarmed or upset. The Park rangers did a good job of informing users prior to spray operations.

Again, due to the large proportion of private land involved in this project, temporary door marking (FS logo) on our leased vehicles was used. These magnetic signs made it easy for landowners to identify project crews and elminiated any possible trespassing complaints. We recommend the use of an easy-to-see vehicle identification on future projects.

Letters were sent to every landowner following completion of spraying operations to inform them that the project had been completed and thanking them for their cooperation. Each landowner was also notified if his property was sprayed, if it was only partially sprayed, which part was sprayed and an explanation why, and if it was not sprayed and an explanation why. Many landowners had more than one parcel of property in the project area. Each of these multiple-parcel landowners was notified about what occurred on each parcel of property regarding spray operations. All property owners were told that they could obtain results of the spray project after the middle of August by visiting either the Umatilla National Forest Headquarters in Pendleton or the Oregon State Department of Forestry office in Pendleton or La Grande where copies of the final report would be available.

CHAPTER 18

INFORMATION

Work began on the Umatilla projects in February. I spent a week on the Forest calling local key contacts, writing a news release, and organizing a press conference. The objective was to inform the public that the Forest anticipated a large-scale spray project. I briefed the Chamber of Commerce in both La Grande and Pendleton and told them approximately how many people they could expect in the communities.

Work continued periodically throughout the early spring, Randy Dohrmann, Deputy Incident Commander organized a public meeting for the landowners in the Meacham unit to advise them about the project.

I arrived in Pendleton on May 16 and the following is a breakdown of activities throughout the projects.

Tours

May 24/25	Washington Office delegation visit. Office briefing, toured Meacham Project area.
June 10	Briefing and field tour with Hance Haney, Resource Assistant to Senator Packwood.
June 18	Meacham field tour for Walla Walla Task Force. Heliport 1 for lift-off, traveled to H-8 to view helicopter landing and reloading, viewed several hours of aerial application on Butcher Ridge, traveled to block 9 to observe entomological sampling.

Speaking Engagements

June 14	Pendleton Kiwanis

Family Meetings

May 17	Briefed FLT on the Wallowa Whitman NF about both projects
May 18	IC Keersemaker briefed La Grande RD employees
May 26	Walla Walla RD, Keersemaker, Stipe, Bridgewater, Jackson
May 26	Supervisor's Office in Pendleton, same

Media

Calls to all on key contact list at start of project

News releases in February, May and end of projects

Field trip with Wil Phinney from the East Oregonian on June 15. Article and photo in June 16 issue of the paper

Daily calls to media once spray started

Radio interviews with Oregon News Network, KORD in Tri Cities, KLBM in La Grande, and KUMA in Pendleton

Interview with Barney Lertin from UPI

Field trip with Nella Latezia, La Grande Observer, June 28.

Miscellaneous

I organized display areas in both headquarters, bulletin boards in the Meacham headquarters and in the Supervisor's Office, and wrote a fact sheet for distribution to public and employees.

We held an open house on both projects prior to spraying.

Media calls are scheduled and a press release will be issued once spray operations end.

CHAPTER 19

SAFETY

The project went very smoothly from the safety aspect. The Entomology and Operations Sections constantly reinforced our safety concerns through daily safety briefings. Both sections need to be commended for their safety effort.

The project was divided into two emphasis stages:

Stage 1: Entomology emphasis (May 9) - This involved giving government drivers' licenses, multi-media first aid, and defensive driving to all 35 of the temporary employees. This training was scheduled over a 3-day period at the start of the project. The drivers were ranked as to their experience level and divided into primary and secondary drivers. This paid big dividends as the temporary drivers only had two minor incidents.

Stage 2: Operation emphasis (May 23) - The operations personnel consisted of all detailers from the State of Oregon, BLM, and Forest Service. Their training consisted of the Crash/ Rescue kit use, project area familiarity and specific job duties. The Crash/Rescue Plan, Contractor's Spill Plan, and the Emergency Medical Plan were formulated at this time.

Flight following during marking operations was through the project dispatch, and during spray operation, observation aircraft were followed by the ATL at the Meacham airstrip.

The safety officer's job on these projects is quite different than on a fire. First of all the safety officer must be familiar with and know how to instruct and coordinate various training needs: government driver's license, defensive driving, first aid, accident investigation and what forms to be filled out when someone has an accident or injury.

Safety Record

Motor vehicle accidents - 1 with damages greater than $350
7 with damages less than $350

Motor vehicle rate = $\frac{\text{\# accidents x 1,000,000}}{\text{\# miles driven}} = \frac{1{,}000{,}00}{100{,}000} = 10$

Aircraft accidents = 0

Aircraft use -

marking/recon	-	2 aircraft for 61.3 hours
observation	-	5 aircraft for 117.6 hours
application	-	6 aircraft for 125.5 hours

Injuries - 6 minor injuries requiring no medical attention
0 lost-time accidents

Accident frequency rate = $\frac{\text{\# accidents x 200,00}}{\text{\# hours worked}} = \frac{0}{24,200} = 0$

Tailgate safety sessions - Daily

Safety messages - 10

CHAPTER 20

COMMUNICATIONS

Two BIFC radio systems were used on this project; a VHF command system for operations, and a UHF logistics system to support the entomologists.

"Base Camp" units for both systems were remoted to Cabbage Hill via Ma Bell's microwave and both repeaters were installed at Mt. Emily utilizing an existing microwave tower to obtain the necessary antenna height. A command "Base Camp" unit was also installed at the Meacham Helibase.

We initially experienced a great deal of interference from other spray units in the Barlow/Dalles/Warm Springs areas due to duplication of command systems. After juggling systems/frequencies (VHF), both systems performed well.

Some recommendations for spray project radio systems:

1. System should contain "Base Camp" units with tone keying capability (to accommodate long distance phone lines and microwave).

2. A kit of mag antennas (gain?) with external antenna adapters should be available.

3. AC power supplies with an adjustable output, 0-15 volt, should be available for Base units and repeaters - each project could require four.

4 Kit radios should be frequencied (or capable of being programmed) for a "manual repeat" mode.

Some other recommendations have been previously addressed but these are probably the most important.

CHAPTER 21

AFFIRMATIVE ACTION

A total of 83 employees (36 Federal/State and 47 local hires) worked at various tasks for various lengths of time on the Meacham Spruce Budworm Spray Project. Employees that filled the positions of Incident Information Officer, Air Operations Director and Communications Leader were shared with the Tollgate project. With exception of the Incident Commander, no employees were assigned to the project full time until April 25 when the Logistics/Finance employees reported for work in Pendelton. The rest of the command staff reported for work on May 2. The remainder of the permanent employees reported to work by May 16 in anticipation of a first spray date of June 1.

Thirty-five local hires started work as part of the entomology crew on May 9 for a week of training including defensive driving and first aid. An additional eight local hires started work on May 31 to work for Dr. Charles Weisner on the spray deposit assessment crew.

Additional personnel that worked on the project via separate agreements included two meteorologists from the National Weather Service each for 2 weeks, three people from the University of New Brunswick in the Providince of Quebec, Canada, and one person from Region 8 in North Carolina. These personnel are not included in any of the employee statistics displayed in this section of the report.

The Affirmative Action statistics for the total work force for the Meacham project are: 58 percent non-minority males, 33 percent minority females, 7 percent minority males and 2 percent minority females. The following table displays a more in-depth categorization of the employees that worked on the project.

	NON-MINORITY		MINORITY		
	MALE	*FEMALE*	*MALE*	*FEMALE*	*TOTAL*
Permanent (Federal)	23 (77%)	7 (23%)	0	0	30*
Permanent (State)	3 (50%)	2 (33%)	1 (17%)	0	6**
Local Hire	22 (47%)	18 (38%)	5 (11%)	2 (4%)	47***
Totals	*48 (58%)*	*27 (33%)*	*6 (7%)*	*2 (2%)*	*83*

* 26 Forest Service; 2 Bureau of Land Management; 2 NOAA
** 3 of State employees were FS retires hired through the State
*** 10 of local hires were veterans

The spraying operations were delayed for approximately 2 weeks due to cool, wet weather. Consequently most of the permanent employees returned to their home units for a week and returned to the project about June 12 for spraying operations which began June 14. Eight of the local hires were assigned work at the Umatilla SO and the Walla Walla Ranger District during the same period of time. Spraying operations continued for 10 consecutive days and were completed on June 23. The majority of the operations personnel were released back to their home units by June 25. Local hires started to be terminated on July 2 and continued to be terminated as the entomological sampling workload was reduced. All post-spray sampling was completed by July 14 and the remaining local hires were terminated by July 16 (six of the local hires were transferred to Ranger District jobs).

CHAPTER 22

PROJECT CRITIQUE

Meacham Pilot Project Midterm Critique

May 27, 1988

The following items were identified by our project staff during a mid-project critique held in Pendleton on May 27, 1988. Only members of the project staff attended. Those items marked with a lower case letter were staff additions to the first draft. A final critique will be scheduled near the end of the operational phase (late June).

1. Report macros for the PC data base are not ready yet. Development of the data base started in the RO by the FPM staff, but the reports formats were not done when the PC systems were sent to the Units. This effort has since been assigned to the Dalles Unit, but other project activities have delayed completion.

2. Plans units were not given clear direction or objectives for what information to collect and process for project documentation, Regional Office needs, or reports to the WO.

3. To improve early project coordination and planning--select and place unit IC's by mid-February and have IC's select Logistics Chief by March 1.

4. Acres figures found in the applications contract and the real acres on the ground do not match very well. A ground truth check should be done prior to contract award by persons familiar with spray operations and entomology sampling.

5. Obtain all the proper pesticide use permits through the proper State office prior to field operations.

5a. Need a list of all State offices which need to be notified before treatment-- OSDF, DEQ, Disaster preparedness, etc.

6. Develop both a planning phase and operations phase budget before request for funding is made.

7. Attendance at some of the early IC meetings seemed to be a bit out of control. Problem improved only a little through mid-project.

8. Setting operations budgets for each unit with an across the board rate per acre is not realistic.

8a. Set a project budget figure early on, and then don't change it a week or two into the project after plans have been made and some items or phases of the plan implemented. Don't apply the same operations costs across the board to pilot projects as operational projects. Pilot projects will always cost more per unit area.

9. Where and when possible, try to avoid the high cost associated with the supply/demand phenomenon.

9a. When you reach the limit of the resource (application aircraft for example) you no longer have competition--the contractors know that and they can demand premium prices.

9b. Could we bypass the formal contracting process and start with contracts with possible operators and do it on a one-to-one basis?

10. When the project overhead staff first arrived on site, the DG terminals were ready to use, phones were in, desks and supplies were set up and ready to go. Having our administrative types report early and having most of the set up tasks completed made the transition into a new job site a minor dusting task.

10a. Need an online data base available to Logistics/Finance section when they report on site to begin tracking supplies as they arrive.

11. Develop a system for detailer qualifications and selection with an allowance for introduction of new talent. Not sure how to handle the temporary hiring needs for the entomology crew under ICS.

12. SO support. In all but one area, support from the SO was above and beyond the call of duty. Special thanks should go to all the local staff units in Pendleton for their excellent work, and a gold star to Rieta Hamilton and company. Our only area of concern were the tasks passed down from the personnel office in Baker. Our experience in this area was very limited and we felt an area this important required help beyond what we could provide, especially for the sign-in of new employees.

12a. The ICS system doesn't deal with hiring temporary employees other than EFF's on AD pay system. We are hiring full-time employees which takes a greater understanding of USFS hiring procedures. Recommend that a person with personnel expertise be assigned to each unit needing temporary help.

12b. Our lack of knowledge of personnel management regulations and procedures resulted in having to release one employee after he had worked a week when, in fact, he should not have been hired to begin with because of an arrest record.

13. It would help the SO staff units to have project staff better outline project needs and their impact on the local unit.

13a. The Forest was told that the project would have little or no impact on them, when in fact the project has had to enlist the Forest's help in several areas--e.g., computer support, procurement, cartography, duplicating, etc.

13b. Not really knowing what the Forest was told and what they thought the local impact would be, it's clear now that any project of this size and duration to function properly needs help from many of the local staff groups. (P.S... If what we hear about next year is true, this might serve as a here-we-come-ready-or-not alert.)

14. A Logistics/Finance person should take part during the early planning phase at the RO level.

15. Do not funnel supply orders through a central location. Have all ordering approved by the Logistics/Finance Chief on a project unit basis. Forget the combined ordering bit including entomology supplies.

15a. Log chief should deal directly with project Entomologist on this--will save duplicate orders and ordering unnecessary supplies.

16. Only use a central delivery point for items needed prior to field operations.

17. Need an administrative type handbook to set policy and procedures for T/A's, travel, Sunday differential, 1st-40 tour, etc.

17a. This should be a short compendium of pertinent USFS and host Forest procedures, policies and regulations to assist the administrative types during the early on-site setup.

17b. Each project site should have a copy of the 3400 manual on insect suppression. It makes good bedtime reading... could help...

18. Unit could use a BMA type person at each location.

18a. Select a BMA person from the host forest as the Logistics/Finance Chief. If this were standard procedure, #17 would not be needed.

19. Extra project supplies from last year were stored at several locations pending distribution to the project sites this year. Inventories of these supplies were made but never available to the Logistics/Finance folks and as a result equipment orders were made which duplicated supplies on hand.

19a. Cache inventories should be provided to Logistics/Finance Chiefs prior to developing orders to GSA, fire cache, etc.

20. Through a coop agreement cache our extra equipment part of the fire cache system.

21. Demobilization. We need a plan soon on what supplies and equipment to leave on the home Forest, to send to a fire cache, or store with FPM. Also the when, how, by, who and where to ship.

22. Our I&I support from the Forest and RO has been excellent.

23. An assignment needs to be made for the production of a spray project operations video tape designed for public use.

24. Communications. We are now on our third radio system. Not sure about all the technical problems but things havn't gone real well. Testing continues.

24a. We could have used an operator's training class.

24b. Recommend Communications Unit leader be moved in the organization from the Logistics/ Finance section to a level under the IC. Need direct and immediate access to and from the IC.

24c. Have Communications unit leader visit the proposed spray area prior to any field operations to help develop a commmunications plan.

24d. Setup a central dispatch area for all communications systems on the project. (operations and entomology).

25. PM and Fire should co-finance a project radio system designed primarily for use within a vehicle.

25a Perhaps the Forest Service should look into having a National Guard or Army Reserve Communication Unit set up and operate a radio system. They have access to equipment, frequencies, etc.

26. Why don't we have our sixth observation aircraft?

27. Our application contract states all dye will be added before shipping. Not so. Dye will be mixed on site by contractor. Not sure of the FS role in this activity or any contract adjustment due the contractor.

28. The SO position set up to coordinate project activities at the Forest level has been very good. It helps to have a single contact to work through. Gary has been responsive to our needs and his assistance has always been timely.

29. Team work between the staff units on the Meacham Unit has gone very well.

30. Entomology staff could have used more field preparation time on site. Their crews (40) started just a week after they arrived in Pendleton. Most of their first week was spent getting maps, etc., organized. Training in first aid, defensive driving, safety, driver certification, etc. are all very important but a time-consuming process for a temporary crew of this size. The entomology staff could have used a week or so in the field to get better oriented before taking the crews out.

31. The various orientation and training classes scheduled by Rich Thurman and Don Scott for the temporary crews was very effective-- defensive driving, driver certification, first aid, map reading, controlled materials, etc., etc.

32. To avoid the very time-consuming job of contacting private land owners for permission to treat their land, the zone of infestation rule should be used.

33. There may be a possible insecticide label violation if used containers are reused for another product.

34. Include ICS training as part of a general orientation or class for at least all project detailers at the general staff and above.

35. Have IC staff and project planners read last year's critique or this year's before they do this again.

36. Having 4x4 vehicles substituted for 2x4's at no extra cost by the leasor was the best thing that could of happened with the project fleet. If standard 2x4 pickup trucks had been provided as requested, it would have been impossible to get our entomology crews and others around on the extremely poor, unmaintained private roads in the unit.

37. Transportation maps were extremely poor in respect to the road system on private land. Project personnel provided much of the information needed to update the transportation map on private lands. Signing private roads by the entomology crew and heliport direction signs by the operations crew made the task of getting around in the field much easier. Advanced mapping should have been done before project personnel began arriving on site. If necessary, a local resident or FS representative with extensive knowledge of the area could have been recruited on a temporary basis to help put private roads info on our maps.

SAFETY CRITIQUE

1. *COMMUNICATIONS*:

   a. What is the feasibility of having one project radio system for both entomology and operations? This would allow them to communicate with each other in case of an emergency.

   b. At the minimum, have a single dispatch center with both entomology and operations radios.

2. *BLUE CARD SYSTEM*:

   a. Need a rating and qualifications system for spray projects similar to the fire red-card system.

3. *MAKE SURE NEXT YEAR'S SPRAY STAFF GET TO SEE THIS CRITIQUE*

4. *CAN WE CONTROL THE CONTRACTORS' PILOTS AND CREW WHEN APPROACHING AND EXITING THEIR AIRCRAFT*

   (i.e., The pilots and ground crew walked under and behind the tail boom while the helicopter was running. This set a bad example for our people when we preach never to do that).

5. *THE SAFETY OFFICER MUST PERFORM AS A TRAINING INSTRUCTION AND/OR COORDINATOR ON THESE TYPES OF PROJECTS*

   Government driver's licenses, defensive driving, first aid, and accident investigation are all part of their responsibilities. They need to be aware of this prior to arriving at the project.

6. *THESE SPRAY PROJECTS HAVE AN INHERENT PROBLEM OF THE LENGTH OF TIME THE DETAILERS MUST BE AWAY FROM HOME*

   The average detailer must be away from home for 2-3 months. This is too long if we are promoting the return detailers for future projects. Some possible alternatives are:

   a. Work a maximum of 3 weeks, then return home for 5 days (similar to Fire).

   b. Have two separate teams--a pre-operations team and an operations team.

   c. Promote more local detailers who can be home most nights.

Training Given to Temporary Entomology Crews

1. Supervisors and support staff need to spend more time organizing training schedules and responsibilities. Supervisors should arrive earlier and prepare for crews' arrival and training.

2. Despite the fact that the training schedule was not always firmed up ahead of time, the training was successful and the individual sessions were well organized.

3. Additional training aids would be helpful particularly during the entomology training sessions. Suggestions include a small-sized consolidated handbook covering sampling techniques, video of various sampling techniques, life-sized photos or silhouettes of various instars, larvae embedded in plastic, etc. Julie Weatherby deserves a good deal of credit for putting together a training package on short order.

4. Rich Thurman and Tom Curtis did a good job of approving the best and most experienced 4-wheel drivers.

5. New employee training was inadequate. The personnel specialist was not prepared to address the necessary items.

Staffing and Tour of Duty

1. The temporary entomology crews were overstaffed.

2. Staffing needs were not adequately communicated between the RPC foliage assessment group and project personnel. Supervisory responsibilities of temporaries working on foliage assessment crew were not adequately addressed.

3. Use of LWOP, AL, SL, and Administrative leave were never satisfactorily resolved for 1st 40-hour tours.

4. First 40-hour tours with guaranteed hours is bad when there is no work. Some people get paid for not working while others earn their wages by working. Maybe other appointments ought to be looked at, but not to exclude benefits (i.e., sick leave and annual leave).

5. A BMA or personnel person who knows the regulations ought to be assigned to the project or at least be available close by.

6. A timekeeper needs to be assigned throughout the project to handle the entomology crew time after the operations group is finished.

Supervision of Entomology Crews

1. Supervisors had the assignments well organized and were ready for crews each morning.

2. At times it appeared that the Supervisors were continually harping at the crews but it has paid off. The jobs were accomplished and the preliminary data look good.

3. The entomology supervisors found that the crews could learn to identify instars. During the time that the crews are developing their abilities to discriminate instars, frequent quality control from the supervisors is mandatory.

4. By rotating crews between spray blocks, errors made by less proficient crews did not consistently contaminate the data for any one block.

5. The supervisors found that unfurled foliage criteria, particularly in heavily infested areas, is not a reliable indicator of when to release blocks.

Equipment - Husky Hunter Data Recorders

1. With the current program, the Husky Hunter worked well as a data entry tool if the crews physically divided the larvae into instar groups before totaling them.

2. Field data entry can save time and may eliminate the need to have a person assigned to enter data on DG.

3. The entomology crews used the Husky Hunters to enter data and to calculate percentages of 2nds, 3rds, and shoots unfurled. The percentages were radioed back to base and the entomologists were able to make release decisions based upon development samples taken on the same morning. This proved to be a very efficient means of getting timely information for the 11:00 a.m. project meeting.

4. Modifications to the program should be made to prevent users from editing the program or erasing data prompt files.

Equipment - Vehicles

1. The vehicles secured for the entomology section were excellent.

2. Four-wheel drives were an absolute necessity on this particular project.

3. Small, 2-wheel drive trucks were too light for use on this project.

Equipment - Radios

1. After the Forest radio technician looked at and fixed the radio system, we had much improved radio transmission.

2. A suggestion was made to investigate the possibility of using a National Guard radio/communications unit on the next project.

Equipment - Maps

1. Transportation map was horrible. A local person could have been used to draw in a lot of the local non-mapped private roads.

Equipment - General

1. Lower crown beating sticker is too small.

2. Bioassay form needs to be modified. The other forms were excellent.

3. Crew kit boxes are too small for all of the equipment. Perhaps BIFC could construct a canvas duffel-type bag which would be handier.

4. Tool chest or box and mounting bracket to hold pole pruner might prevent damage to pickup beds.

Facilities

1. Unusually good space for entomology crew. Only major criticism was the lack of electrical outlets.

Interactions with Other Project Individuals and Teams

1. Jim Conn and people in his section were excellent and very responsive.
2. Didn't have a supply of CA-1 or accident forms to resupply rigs.
3. Safety was not adequately addressed for the entomology crews and supervisors. The safety plan was too generic. Rich, however, did a good job.
4. Not much concern for safety of entomology crews after dispatch and safety left project.
5. All interactions were good to excellent with other project individuals or teams.

ENTOMOLOGY CREW CRITIQUE SUMMARY

A critique of the Meacham Spruce Budworm Project was conducted by the entomology crew (temporaries) at the conclusion of the project. Since a number of indivduals had left the project early to take other jobs, and others were reassigned to other duties, only 28 respondents out of the original 37 Umatilla temporary employees, provided input into this critique. The following is a summarization of responses and comments to questions posed by the written critique.

Training

Crews felt that the training they received was moderately to very important in preparing them for the job. Temporary crews received instruction in defensive driving, multi-media first aid, budworm sampling, map reading, and varying amounts of one-on-one individualized training. Several crew members commented that the multi-medial first aid training was a joke. This training was presented to two different groups using two different instructors. Differences in instructors' abilities to motivate interest and enthusiasm, and their own attitudes and quality of their presentations may account for some of the negative comments. One cannot deny the importance of first aid training for field-oriented crews.

Overall, crews felt instruction was of good quality. Budworm sampling procedures received the highest marks with 48 percent of the respondents placing the quality of instruction in the excellent category, and an additional 48 percent felt the instruction was good. Some differences in judgement among the three professional entomologists in classifying second and third instars led to some confusion among the crews initially. But as budworm larvae advanced to older instars and it was easier to discriminate stages, this problem was resolved. Accordingly, some individuals believed that it would be better to have only one person instruct crews on sampling procedures to keep it consistent.

Entomology crews felt that the orientation they received on time and attendance, tour of duty, use of leave, pay, ethics and conduct, etc. was mostly adequate with the trend in responses tending toward the inadequate side. A great deal of confusion abounded among crew and supervisors alike over the 1st 40 tour of duty. As a result, we operated under the incorrect assumption that crew members were guaranteed 40 hours of pay per week whether they worked or not due to weather, insect development, or other factors outside of our control. Confusion also occurred over the use of leave and in particular when leave should or could be charged to leave without pay as opposed to annual leave.

Training crews to identify 2nd, 3rd, and 4th instars were split roughly 50/50 between moderately and highly successful. However, an overwhelming number of the crew (80 percent) felt that they were highly successful in their ability to discriminate 5th and 6th instars.

Husky Hunter field data recorder operators were equally split between moderate and very well categories in assessing how well instructions and practice sessions prepared them for using the Husky Hunters in the field.

Assigned Jobs

A majority of the entomology crew (61 percent) felt that daily work assignments were always clear, and the remainder felt that assignments were usually clear. Work assignments took crews about 8 hours or less to complete. Some felt that the entomology section was overstaffed for the amount of work that needed to be done. Crew overtime was fairly minimal as a result, but on numerous occasions crews completed work early and were sent home. In retrospect, except during a critical sampling period or when the workload was particularly heavy due to foliage bioassay, development, and prespray sampling occurring simultaneously, the entomology section could have operated with probably 6 to 8 fewer temporaries.

The majority (62 percent) of crew members felt that they were always adequately prepared to accomplish their assigned work. The remainder were usually prepared.

For the supervisors, training remained an on-going process throughout the project. Handouts describing and illustrating the sampling procedures were liberally used and certain procedures were repeated or emphasized over and over to insure compliance with standardized procedures and accuracy of results. In spite of training and frequent reviews, some individuals were less committed to the work and were marginal performers. Some entomology crews commented that these individuals should probably have been fired for incompetence.

Supervision

The overwhelming majority (93 percent) of respondents felt that the level of supervision they received was adequate. Only 7 percent believed that the supervision was too loose to suit them.

Most of the field work was done independently without close inspection because of the area to cover on the project. In spite of this, crews felt that supervisors were usually available to help them when needed. A larger majority felt that supervisors were always available to help during the laboratory phases of the work. Supervisors were usually consistent with their instructions and advice, and crews felt that morning briefings and safety messages were useful in disseminating information, identifying work hazards, providing instructions, clarifying work assignments, etc.

Some crews felt that the supervisors should have cracked down more on unnecessary use of radios, people who would not call in if they were going to be late or absent from work, and those who mistreated or were rough on project vehicles and equipment. One or two respondents felt that supervisors shouldn't be so repetitive about everything. Some crew members commented that supervisors did an outstanding job.

Equipment and Facilities

The majority of the Meacham Analysis Unit was on privately held lands and roads were poorly maintained. This, in combination with runoff from snowmelt and rainfall during the project, made for extremely difficult and muddy driving conditions. Nearly all project pickup trucks were full-sized, 4-wheel drives. All of the entomolgoy crew believed that 4-wheel drive vehicles were important to accomplish the field work safely. The majority (57 percent) felt they were extremely important. They also felt that small-sized pickups would be worse than full-sized pickups.

Equipment used by crews in the field and laboratory were viewed as good and satisfactory for accomplishing the work of the entomology section. Crews felt that forms used for recording sampling data were easy to use, understandable, and clear. Signs were used on road junctions to mark directions to plots. Some crew members felt they should have been larger, like the helispot signs.

One difficulty experienced by crews numerous times during the project was difficulty in locating some plots. Crews establishing plots prepared plot location data sheets and maps. Many of these were incomplete or inaccurate. Numerous comments and suggestions were made by the crews to improve the usefulness of these maps including the following: (1) make sure maps get updated when changes are made, (2) need a 1-day training session on map reading and drawing, (3) use section markers, odometer readings, and compass bearings when providing direction on maps, (4) have 1-page block maps drawn up before cres go to field, and have crews draw in new roads and plot locations, (5) send supervisors to check map accuracy, and (6) have someone start early to put in all plots. Crews felt that the project headquarters was good to excellent as a meeting place and work laboratory.

Interaction with Other Project Individuals or Teams

The consensus of the entomology crew was that they--individually and collectively--received good to excellent support from logistics and finance, supply/fleet, time clerks, and safety.

Entomology crews had widely differing responses to interactions with other individuals or teams outside the area of administrative support. The vast majority of the crews had no or very little contact with these other sections of the project and, therefore, their responses could not be identified as representing any particular trend or pattern. Some of the entomology crew did comment that they felt the operations section seemed to get preferential treatment, however, and that they were not treated as project equals by the spray assessment group.

General Information

Entomology crews overwhelmingly viewed their work on the project as a positive experience. Many mentioned the opportunity to work outdoors, meet new people, and learn about budworm and how it damages trees as some of their most memorable experiences on the project. Most crew members (75 percent) said they would apply for a job on a future spray project in a minute, while another 18 percent said maybe. Seven percent said they would return if they got a raise.

Numerous things were cited by crews as being especially good about their work on the project. Among them were: (1) being outside in the mountains, (2) seeing a bear at 50 yards, (3) seeing the damage budworm can do to large trees (4) meeting dedicated Forest Service employees, (5) fun radio talk, (6) appreciated the good attitude displayed by employees, (7) social events, (8) being on my own to make judgement decisions, (9) good supervisors,and (10) the pay. The points cited by crews regarding what they did not like about the work included: (1) inconsistent work hours, (2) change partners more frequently, (3) too early starting time, (4) a lot of wasted time, (5) short work days, (6) group practice sessions, (7) lab work, (8) over staffed, (9) crews checking each other and changing plots, (10) CA-1's.

ENTOMOLOGY CREW CRITIQUE

Please respond to the following items by circling the words which most closely describe your opinions.

I. TRAINING

1) How important were the following training experiences in preparing you for the job?

a) Defensive Driving	Very Important	Moderately Important	Not Very Important
	62%	23%	15%
b) Multi-media First Aid Training	Very Important	Moderately Important	Not Very Important
	38%	50%	12%
c) Budworm Sampling Procedures	Very Important	Moderately Important	Not Very Important
	81%	15%	4%
d) One-on-one Individualized Training	Very Important	Moderately Important	Not Very Important
	44%	41%	15%
e) Map Reading	Very Important	Moderately Important	Not Very Important
	62%	27%	12%

COMMENTS: (Suggestions and criticisms)

1) More intensive instruction on map reading
2) More 4-wheel drive training
3) Multi-media first aid course was a joke

2. How would you rate the quality of the instruction during the following taining experiences?

a) Defensive Driving	Poor	Fair	Good	Excellent
	0	24%	68%	8%
b) Multi-media First Aid Training	Poor	Fair	Good	Excellent
	8	31%	50%	12%
c) Budworm Sampling Procedures	Poor	Fair	Good	Excellent
	0	4%	48%	48%
d) One-on-one Individualized Training	Poor	Fair	Good	Excellent
	12%	31%	38%	19%
e) Map Reading	Poor	Fair	Good	Excellent
	4%	27%	54%	15%

COMMENTS: (Suggestions and criticisms)

1) Have one person instruct crews on sampling procedures (keep it consistent)

I. TRAINING, (cont.)

3) The following items should have been addressed in your new employee orientation. Indicate if this training adequately addressed these items.

a) 1st 40 Tour of Duty	Not Adequate	Adequate	More Than Adequate
	29%	71%	0
b) Use of Sick Leave, Annual Leave, and Leave Without Pay	Not Adequate	Adequate	More Than Adequate
	36%	57%	7%
c) Pay (Regular, Overtime, Premium, Pay Periods)	Not Adequate	Adequate	More Than Adequate
	18%	75%	7%
d) Ethics and Conduct	Not Adequate	Adequate	More Than Adequate
	4%	74%	22%

COMMENTS: (Suggestions and Criticisms)

1) 1st 40 was not explained adequately.
2) Confused about Sick Leave, Annual Leave, Leave Without Pay.
3) Supervisors too lax on conduct.
4) Didn't understand codes on time sheet.
5) No one was sure what benefits applied to temporaries.

4) This is the first year that the crews have been asked to determine larval instars in the field. How would you rate your ability to discriminate 2nd, 3rd, and 4th instars?

Not Very Successful	Moderately Successful	Highly Successful
4%	46%	50%

5) How would you rate your ability to discriminate 5th and 6th instars?

Not Very Successful	Moderately Successful	Highly Successful
0	11%	89%

6) Would additional training or training aides help improve your instar determinations?

No	Probably	Definitely
20%	48%	32%

COMMENTS: (Suggestions and criticisms)

1) One person should be in charge of instar training.
2) More instruction on instar discrimination would be helpful.
3) Having samples of various instars to take to the field was helpful.

7) How would you rate your ability to classify unfurled foliage?

Not Very Successful	Moderately Successful	Highly Successful
	68%	32%

Would additional training or training aides help improve your determination of unfurled foliage?

No	Probably	Definitely
11%	70%	19%

COMMENTS: (Suggestions and criticisms)

1) Need a more precise definition.

I. TRAINING, (cont.)

If you are a Husky Hunter operator, please answer the following questions.

6) How well did the instructions and practice sessions prepare you for using the Husky Hunter as a field data recorder?

Not Well	Moderately Well	Very Well
0	50%	50%

7) Did you feel that the "form04.hba" program used to enter development data was an efficient and effective means of data entry?

No	Moderately Efficient	Very Efficient
0	54%	45%

8) If you could modify the "form04.hba" program, what changes would you make to improve the usefulness and efficiency of the Husky Hunter for field data entry?

1) Easier and quicker access to get into program.
2) More editing capabilities.
3) Make program tally instars.
4) When done, have program display data from all four trees for editing purposes.

COMMENTS: (Suggestions and Criticisims) Crew Comments

1) Use Hunters in place of data sheets.

II. ASSIGNED JOBS

1) Were the daily assignments clear?

Not Clear	Usually Clear	Always Clear
0	39%	61%

2) On an average, how long did it take you to complete the assigned work load?

Less than 8 hours	About 8 hours	More than 8 hours
36%	54%	11%

3) Were you adequately prepared to accomplish the assigned work?

No	Usually	Always
0	38%	62%

COMMENTS: (Suggestions and criticisms)

1) Too many people on job.
2) Some people should probably have been fired for incompetence.

III. SUPERVISION

1) How would you rate the supervision you received?

Too Loose	Adequate	Too Tight
7%	93%	0

1) Need more spot checking of crews to ensure quality of work.

III. SUPERVISION (cont.)

2) Were the supervisors available to help you during your field work?

Infrequently	Usually	Always
7%	71%	21%

3) Were the supervisors available to help you during your lab work?

Infrequently	Usually	Always
0	19%	81%

4) Were the supervisors reasonably consistent with their instructions and advice?

No	Usually	Always
0	67%	33%

5) Were the morning briefings useful in disseminating information, providing instructions, clarifying work assignments, etc.?

No	Usually	Always
4%	44%	52%

6) Were the safety messages and briefings beneficial to you in identifying work hazards and in passing along safety tips?

No	Usually	Always
4%	56%	41%

7) What would you change or do differently if you were the entomology supervisor?

1) Crack down on unnecessary use of radios.
2) Don't be so repetitive about everything.
3) Be more concerned about some drivers.
4) More individual instructions rather than group.
5) Make sure crews know to notify supervisors if they will not be at work.

COMMENTS: (Suggestions and criticisims)

1) Hazards could be marked on big map on the wall with some kind of symbol and then a description tacked up next to it. Crews could reference the list.

2) Try having information on other topics related to budworm (newspaper clippings, videos, etc.).

3) Supervisors did an outstanding job.

4) Limited assignment sheets could save paper.

IV. EQUIPMENT AND FACILITIES

1) What type of vehicle was assigned to you or your original partner at the beginning of the project?

2-Wheel Drive	4-Wheel Drive
7%	93%

2) In your opinion, how important was it to have the use of a 4-wheel drive rather than a 2-wheel drive vehicle?

Not Very Important	Moderately Important	Extremely Important
0	33%	67%

IV. EQUIPMENT AND FACILITIES (cont.)

3) In your opinion, would a small-sized pickup truck have worked better than a full-sized truck, given the road conditions on the project?

Better	Worse	No Difference	I Don't Know
4%	72%	12%	12%

COMMENTS: (Suggestions and criticisims)

1) Small pickup could be more fuel efficient.

4) How many times did you get stuck requiring either digging the vehicle out or towing the vehicle out?

0	1	2	3 or more
71%	29%	0%	0%

5) At the beginning of the project, were you licensed as a designated or alternate 4-wheel driver?

Designated Driver	Alternate Driver
56%	44%

6) How many times on an average did you drive per week?

0	1	2	3	4	5 or more
11%	19%	4%	15%	15%	37%

COMMENTS: (Suggestions and criticisms)

7) From a safety standpoint, did you feel that the radio system was functioning sufficiently well for you to obtain help if needed?

Not Adequate	Usually Adequate	Always Adequate
43%	54%	4%

8) From an operational standpoint, how would you rate the quality of the radio transmission between:

a) you and crews within the same block (channel 1)

Not Adequate	Usually Adequate	Always Adequate
4%	75%	21%

b) you and crews in different blocks (channel 1)

Not Adequate	Usually Adequate	Always Adequate
54%	43%	4%

c) you and Meacham Base (channel 2)

Not Adequate	Usually Adequate	Always Adequate
54%	46%	0%

9) What could we have done differently to improve the radio communications between crews or between crew and Meacham Base?

1) Newer radios
2) Cellular phones
3) Better radios
4) Radio system designed for mountain use
5) CB's in each rig

COMMENTS: (Suggestions and criticisms)

IV. EQUIPMENT AND FACILITIES, (cont.)

10) How would you rate the laboratory equipment,work tables, chairs, magnifier ring lamps, etc.?

Poor	Fair	Good	Excellent
	11%	64%	25%

COMMENTS: (Suggestions and criticisms)

11) Numerous forms were used throughout the project, how would you rate the use of these forms? Circle one.

a. Too complex, unclear, and confusing	0
b. Forms were usable, but could have been a little clearer or less complex.	4%
c. Forms were easy to use and reasonably clear.	48%
d. Forms were very clear, understandable, and easy to use.	48%

COMMENTS: (Suggestions and criticisms)

12) The following items of equipment were issued to you during this project. Were these items satisfactory?

	Satisfactory	Unsatisfactory
a) beating cloth and stick	96%	4%
b) pole pruners	96%	4%
c) hand clippers	86%	14%
d) crew kits	100%	0
e) shovel	96%	4%
f) Polaski	96%	4%
g) first aid kit	100%	0
h) fire extinguisher	100%	0
i) hard hats	96%	4%
j) canteens	96%	4%
k) individual expendable items (i.e., water bottles, bug repellent, etc.)	100%	0

COMMENTS: (Suggestions and criticisms)

1) Clippers don't remain sharp.
2) Shovels and Polaski - handles too short
3) Expendable items - unnecessary

IV. EQUIPMENT AND FACILITIES, (cont.)

13) What additional equipment would have been useful?

1) Sun screen
2) Handyman jack
3) Card table for field work

COMMENTS: (Suggestions and criticisms)

1) Tool boxes attached to pickup beds.
2) Beating cloths could be washed more.
3) Red pole pruners were worthless.

14) Which maps did you use most frequently to locate plots?

2":mile map of entire area	Both	Page-sized block maps
18%	18%	64%

15) How useful were the plot location data sheets?

Not Useful	Moderately Useful	Extremely Useful
10%	69%	21%

16) Several discrepancies were reported between actual plot locations and the maps. How could we improve the plot establishment and mapping procedues to eliminate these discrepancies?

1) Make sure maps get updated.
2) Use signs like helispot signs
3) 1-day training on map reading and drawing
4) Use section markers, odometer readings, compass bearings, etc.
5) Have one page block maps drawn up before crews go to field; have crews draw in new roads and plot locations.
6) Send supervisor to check map accuracy.
7) Have someone start early to put in all plots.

17) How would you rate the project headquarters as a meeting place and work laboratory?

Poor	Fair	Good	Excellent
	11%	50%	39%

V. INTERACTION WITH OTHER PROJECT INDIVIDUALS OR TEAMS

1) How would you rate the support you or the entomology group received from:

a) Logistics & Finance (Jim Conn)	Excellent	Good	Fair	Poor	I Don't Know
	54%	39%	0	0	7%
b) Supply/Fleet (Jerry McKinney)	Excellent	Good	Fair	Poor	I Don't Know
	50%	39%	7%	0	4%
c) Time Clerk (Martiese & Penny)	Excellent	Good	Fair	Poor	I Don't Know
	39%	39%	11%	0	11%
d) Safey (Rich Thurman)	Excellent	Good	Fair	Poor	I Don't Know
	43%	50%	7%	0	0

IV. EQUIPMENT AND FACILITIES, (cont.)

1) How would you rate your interactions with the following project individuals or teams:

a) Incident Commander (Larry Stipe)

Excellent	Good	Fair	Poor	I Don't Know
14%	36%	25%	0	25%

b) Deputy IC (Randy Dohrmann)

Excellent	Good	Fair	Poor	I Don't Know
7%	29%	29%	4%	32%

c) Plans (Dean Bishop)

Excellent	Good	Fair	Poor	I Don't Know
11%	29%	29%	04%	29%

d) Operations (Gordon Orloff)

Excellent	Good	Fair	Poor	I Don't Know
4%	29%	18%	7%	43%

e) Public Information (Alexis Jackson)

Excellent	Good	Fair	Poor	I Don't Know
0%	39%	14%	0	68%

f) Dispatch (Barry Griffith)

Excellent	Good	Fair	Poor	I Don't Know
4%	25%	14%	0	57%

g) Pathlink Coordinator (Tim McConnell

Excellent	Good	Fair	Poor	I Don't Know
7%	14%	14%	0	64%

h) Spray Assessment Crew (Canadians)

Excellent	Good	Fair	Poor	I Don't Know
10%	31%	21%	7%	31%

COMMENTS: (Suggestions and criticisms)

1) Operations seemed to get preferential treatment.
2) Spray assessment crew was snobby and Dr. Weisner treated us like imbeciles.

VI. GENERAL INFORMATION

1) What is your most memorable happening from the 1988 Meacham Budworm Spray Project?

1) Learning procedures used in budworm control.
2) Meeting new people.
3) Wildlife.
4) The picnics.
5) Comradery among crews.
6) Trying to find plot 5 on MIXT before map was revised.
7) Seeing things progress through the season.

2) Would you apply for a job on a future spray project?

In A Minute	Absolutely Not	Maybe	If I Get A Raise
75%	0	18%	7%

3) What was particularly good about your work on the project?

1) Being outside in the mountains.
2) A bear at 50 yards.
3) Seeing the damage budworm can do to large trees.
4) Meeting dedicated Forest Service employees.
5) Fun radio talk.
6) Appreciated good attitude displayed by employees.
7) Social events were good.
8) Being on my own to make judgment decisions.
9) Good supervisors.
10) The pay.

4) What did you not like about your work on the project?

1) Inconsistant work hours
2) Change partners more frequently
3) Too early starting time
4) A lot of wasted time
5) Short work days
6) Group practice sessions
7) Lab work
8) Over staffed
9) Crews checking each other & changing plots
10) CA-1

PLANS CRITIQUE

GENERAL STATEMENT: I feel the overall project went quite well. For the first time in my experience in a planning section, we met the needs of the project. Despite the fact that the database software was, and still is, in a state of change, we were able to produce quality reports to help support the project. The mapping aspect seemed to be successful. With the help of others on the project and the support of the Umatilla NF headquarters, I was able to keep up with the mapping changes and supply the project with the quality and quantity of maps required. The project was lucky to have the expertise of two fine meteorologists from the U.S. Weather Service. Having a phone link to access the AFFIRMS weather helped greatly.

From a planning standpoint, I feel the people here did a great job in support of each other. It is the nature of spray projects to be very demanding and, with few exceptions, everyone cooperated and helped me do my part in supporting the operation. Operations, entomology, administration, and the Director communicated in a way that was positive and productive. I think the area command deserves credit for picking up the pieces when they did. During the early development of the database programs in the RO, I found myself frustrated with the lack of progress and was not sure how to develop a computer system to cover all the questions that would be asked during and at the end of the project. My one complaint is that more careful thought must be given to (1) what information needs to be tracked, and (2) how refined should it be? Perhaps a special team of veteran project people, FPM personnel and area command could help decide these questions.

COMPUTER HARDWARE: The computer system used on the project met the needs of the job. I experienced little, if any, problems with the equipment and would recommend it in future projects. The Hewlette-Packard color plotter, Bernoulli system, Smartmoden and the CEOCONNECT system all added to better output production and communications.

COMPUTER SOFTWARE: The main software program used on the project was Paradox2. As its name implies, this software has many strengths and weaknesses. It has a big advantage over Dbase programs such as Dbase III in that it writes its own program script and, thus, saved countless hours in developing a package that could support the project. It does, however, lack some of the strengths of other database software in sorting abilities and report writing. One real advantage of Paradox2 is the fact that people other than expert programmers can create databases, create input forms, and write reports within a limited time. This is a distinct advantage in spray projects that require flexibility in planning. I would recommend a user-friendly Dbase program such as Paradox2 in future projects unless time allows for thorough planning of project needs, or a full-time programmer is hired on each project.

The graphics we used on the spruce budworm project was Harvard Graphics. I found this software to be both friendly and very useful. It lends itself to computer novices and can produce excellent charts. I would recommend it to be used on future projects.

We used both CEOWRITE and CEOCONNECT as word processors. This is DG-compatible software so using it was not hard to learn. We did not receive the documentation for CEOWRITE so I found it a bit difficult to discover some of the minor changes. It is different from the standard edition on most forest systems. Having the ability to use the PC as a DG terminal and transfer files between each was a distict advantage and should be a standard installation on future projects.

The directory system used was 1Dirplus. It took me quite a while to understand it as it is multilayered and not as user friendly as PCTOOLS. In the future, I would lean toward a simpler system such as PCTOOLS.

One problem we encountered was using the Pathlink program. The standard hard drive configuration for Pathlink is a C: drive. The hard drive for this project was sectored into three drives, thus, the Pathlink programs could not operate correctly.

CLOSING STATEMENT: I feel good to have worked with a group of creative and fun-loving professionals during this project and hope to have the chance to do so again. I enjoyed myself and at the same time helped to protect a valuable resource.

OPERATIONS CRITIQUE

Additional critique items from the Operations section.

1. Felt IC's system was the system to use, but in some areas it needs major adjustment.

2. Vehicles were excellent.

3. Most (one ecxeption) said they would not do another project if limited to 8- to 10-hour days. Not practical from contract administration standpoint or worth the time away from home.

4. Break in project was basically well accepted, but felt decision was too quick with many unanswered questions.

5. IC was well liked and rated a grade of A+.

6. Radio problems not acceptable. Communications unit leader only needed for 2-3 hours at beginning of project. Radio tech needed.

7. Training in Eugene was poor. Liked the idea of conducting the training on the project.

8. Use of local hire ground observers the only way to go. They are familiar with the area and because of their knowledge of getting around in the project area, we felt they saved us a day of spraying by being able to monitor the deposit and allowing us to continue a few minutes more in many instances.

9. Forest Service should develop a system to qualify people and organize teams to respond to spraying project needs. This would save money by reducing the time spent on the project.

10. Too much time spent on timekeeping problems because of the different directions given. Suggested we work basic straight 8-hour days to eliminate confusion.

11. Some folks felt that safety spent too much time with operations and were uncomfortable about being bothered by the constant presence of safety officer.

12. Need to streamline process of block release times.

13. Felt plot locations could have been consolidated and moved further from block boundaries.

14. As the project progressed, more and more information was requested. It would be nice to know before the project begins what kinds of information is needed and it would be collected in the same format.

15. Use cost per acre figures from previous projects in planning phase.

16. Need better understanding between ACA and the COR concerning contract decisions.

17. Need to correct batch track inspection requirements in the contract.

18. Need to streamline the helicopter, pilot, fuel truck inspections. Appears we have people checking each other's inspections.

19. Reuse of used insecticide containers remains an unresolved question.

20. Use of a dry run (simulated spray day) following initial crew training was a very effective way to have the crew exercise their skills and develop the necessary team work. It was also very helpful in identifying minor problems. We found things look a lot different in the pre-dawn darkness one can only find at 3:00 a.m.

METEOROLOGY CRITIQUE

1. Field weather observations

   a. Field observations should be received prior to issuance of forecast. Forecast issuance was around 1300 PDT and observations were normally received after that time. Forecast accuracy can be improved by the receipt of timely weather observations.

   b. Observation quality seems good. I would suggest that a brief meteorologist-field observers training session would be advantageous. Training would review and emphasize psychrometer measurements and taking representative observations.

   c. The field weather report form should be modified to provide aspect and better location data. In addition to the current data, each line should contain space for aspect (ridge, valley, mid-slope, direction slope faces), location (down to the 1/4 section) and elevation. Also, all information must be legible.

2. RAWS (Remote Automatic Weather Station)

   Platform siting should be coordinated with the project meteorologist. There were no RAWS platforms on this project (Tollgate has two RAWS); I mention this for future projects.

3. Satellite pictures

   Satellite picture acquisition using NWS hardware (a Techmar enhanced CGA graphics board installed in the FS Compaq 386 desktop computer) and software was scrapped due to computer-graphics board incompatibility. This was not a major problem due to the fair weather pattern during spraying. However, satellite imagery acquisition should be pursued for future spray projects. We may not be as lucky next time.

LOGISTICS/FINANCE CRITIQUE

On balance, the Logistic/Finance Section enjoyed excellent cooperation while on the project. The staff of the Umatilla National Forest was very supportive and helpful. The Logistictics/Finance staff (Martiese Orloff, Jerry McKinney, Penny Martin, and John Johnson [Communications Unit Leader shared with Tollgate]) were extremely competent, easy to work with and worked well as a team.

I have addressed most of my critique items on the mid-term critique. I feel it is necessary to reiterate the most important here:

1. If full-time, temporary employees are hired, there must be a person with personnel expertise detailed to handle that task.

2. To avoid the time and tour-of-duty problems we had this year, those issues must be clarified--in plain language--prior to the project start. This is a critical issue.

3. Communications system(s) must be better.

The pluses for the Logistics/Finance Section include:

a. An excellent IC. Larry provided guidance as necessary yet didn't try to make my decisions; let me do my job.

b. The Operation Chief is one of the best, if not the best available. Provided excellent interface with my Section. This is also true of the Entomology Chief. These are very competent people.

c. Help and assistance from the Umatilla NF staff. They outdid themselves.

d. Project offices - served all with room needed.

This was my first spray project for "bugs." If all projects go as smoothly as Meacham (there were some humps and bumps, but in perspective, only T&A problem was bad), they would be a snap. I do know that my staff performed in an outstanding manner and without them this project would have suffered. If only the other troops knew how much work was done for them, they would be surprised.

CHAPTER 23

DEMOBILIZATION

1. All supplies, equipment from fire cache will be returned as soon as use is complete.

2. BIFC, RAC items returned to original supplier site.

3. Fire cache items will be identified by a white label with: NFES number, noun name, and quanity/unit of issue.

4. Non-fire cache items will be identified with white label with: special RAC number, noun name, and quantity/unit of issue.

5. All supplies with shelf/inspection date will be so noted.

6. Total cubic feet of demobolization supplies will be supplied to ACA at end of demobilization.

A. Operations phase of demobolization (0 - last spray day)

ODM-5 All personnel, supplies, equipment, materials, and vehicles not needed past spray completion identified.

ODM-4 ACA notified of release date of identified items, personnel.

ODM-3 Tollgate, The Dalles notified of pending demobolization of Meacham - offer of supplies, etc. to them.

ODM-2 Umatilla dispatch given resource orders for demobilization personnel.

ODM-0 End of operational (spray) phase of project.

ODM+1 a. Personnel release
- Performance evaluations
- Equipment turn-in
- Umatilla dispatch notifies home district

b. Continue packing up all items identified for demobolization until complete.

ODM++ Load and transport to Redmond cache

B. Demobolization of Entomology Phase (0 = last Ent sample)

EDM-3 Project demobolization date set, ACA notified of release, completion of project. Umatilla NF notified to remove phones, DG's, PC's, arrange termination of building lease, garbage, etc. contact Fred Reniger at the SO.

EDM-2 ACA provides final instructions for transport of all remaining project supplies, equipment and materials.

EDM-0 End of project

- Leased vehicle returned to control of contracting officer, Wallowa-Whitman NF
- Leased building turned back to Umatilla NF contracting officer
- All leased refrigerants, freezers returned
- Load and transport everything that must be sent to cache of RO/FPM

CHAPTER 24

PROJECT BUDGET

A total of $691,000 was allocated to the Umatilla National Forest for the administration of this spray project. Other expenses attributed to the project but paid for by the Regional Office included: insecticide - $321,682, aerial boundary marking - $18,838, and application of insecticide - $555,269.

Several items were removed from the administrative portion of the budget during the early stages of the project that included: meteorology work, air sampling, spray deposit card sampling, water sampling, and a reduction of personnel. A limit was also placed on the amount of overtime a person could earn each week.

The following is the final budget for project administration for the Meacham Pilot Spray Project and is based on actual expenditures through June 30 and estimated expenditures after June 30.

EXPENSES

Salaries	$367,688
Per Diem	$ 66,000
Supplies	$ 14,500
Vehicles:	
Rental Contract	$ 88,000
Gasoline	$ 10,000
Claims	$ 2,500
Building Lease	$ 10,000
Office Equipment	$ 2,000
Computers and Data Processing	$ 7,892
Telephone (inc. installation)	$ 5,650
Electricity	$ 1,200
Garbage Service	$ 300
Janitorial Service	$ 400
Miscellaneous Expenses	$ 6,000
Pathlink Equipment	$ 11,500
Spray Deposit Coop. Agreement	$ 31,750
Total Expenses	$625,380

BUDGET SUMMARY

FOREST ALLOCATION FROM REGION	$691,000
TOTAL BUDGETED PROJECT EXPENSES	$625,380
ITEMS BUDGETED BUT NOT CHARGED	
(Paid for by R.O.)	
Pathlink Equipment	$ 11,500
Spray Deposit Assessment Coop. Agreement	$ 31,500
PROJECTED SAVINGS	$108,620

CHAPTER 25

ICS 214 DAILY SUMMARY

The following daily activity log summary was taken from the ICS 214 of the Command and general staff members on the Meacham Unit for the operatOPSns period from May 2 to July 16, 1988. Information is separated by staff group.

Daily Activity Log Summary

Date:	5/2/88
IC	Open Meacham Unit office at 724 Airport Road with eight detailers on site.
IO	Met with Norm Parker at Newburg to plan prework on May 4
Date:	5/3/88
IC	Project staff meeting
ENT	Assistant entomologist and field leader arrived on project
Date:	5/4/88
ENT	Select evaluation and development plot locations
OPS	Contract pre-work meeting with Western Helicopter Services
Date:	5/5/88
IC	Temporary crew hiring complete (50) - report dates set
ENT	Select evaluation and development plot locations
Date:	5/6/88
Safety	Law enforcement briefing and safety review
Date:	5/7/88
IC	Develop budget alternatives
Date:	5/8/88
IC	Off duty

Date:	5/9/88
IC	Expand budget alternatives
DIC	Met with Roger Simpson (negative response to request to use his land)
ENT	Field crew first day. New employee sign up and orientation; driving orientation and tests
OPS	Scheduled Dipel delivery to the Meacham airstrip area for May 25. State of Oregon to inspect contract fuel and batch trucks during week of May 25
Date:	5/10/88
IC	IC meeting at The Dalles - present our budget alternatives
DIC	With Vance Kleyn; visited two potential hostile (?) landowners
ENT	Continue entomology crew training (multi-media first aid, defensive driving, and toxic waste/ drugs activities orientation)
Date	5/11/88
IC	Deadman repeater not giving complete coverage of project area
DIC	Met with Campfire Girls' Director who granted permission to treat their land
ENT	Continue entomology crew training (first aid, defensive driving, radio communications, safety plan).
OPS	First marking helicopter arrived Verbal OK of Notice to Proceed Order (formal order mailed)
Date:	5/12/88
IC	Released five operations crew prior to their arrival
DIC	Help develop new project budget. Develop ownership figures by block for ACA
IO	Public meeting held at Meacham Fire House.
ENT	Continue entomology crew training (field training)
OPS	Block boundary aerial marking started

Date:	5/13/88
IC	Budget approved at $691,000 for 56,000 acres
DIC	Digitize host type by block
ENT	Continue entomology crew training (field training)
L/G	Moved repeater to Mt. Emily
Date:	5/15/88
IC	Off duty
ENT	Select evaluation and development plot locations, 95 percent complete
OPS	Made modification in use period for marking slips
Date:	5/16/88
IC	Stan Cullimore and I met with Bill Handley about apparent falsfication of SF 171. Handley chose to resign.
DIC	Update BIA (Tom Haberstroh) on project status and changes in monitoring plan. Update CTUIR (Randy Williams) same as above.
ENT	Installed evaluation and development plots
Date:	5/17/88
IC	Project staff meeting
DIC	Met with Charlie (Cunningham Sheep Co.) to determine pre-project road conditions. Check road conditions to H-9, H-10, and H-11
IO	Project briefing to Wallowa-Whitman NF
Date:	5/18/88
IC	Draft agenda for WO visit. Changed Weisner crew reporting date from May 23 to May 31.
DIC	Assist with WO visit plans
Safety	Man-caused fire at T25N R36E Sec.3 NE reported to Forest Dispatch
IO	Briefing for LaGrande RD
ENT	Installed evaluation and development plots

Date:	5/19/88
IC	Uma, IC, and Woody met in LaGrande. Scheduled SO briefing for each Monday at 0800. Tour Meacham project area with Woody.
DIC	Update Paul Joseph (OSDF) on landowner status
ENT	Installed evaluation and development plots
OPS	Norm Parker inspecting tentative heliport sites. Aerial marking completed.
Date:	5/20/88
IC	Visit blocks 4, 6, and 8 with Bob Eder
DIC	Staff meeting in Walla Walla
Safety	Crash rescue kit training for operations crew by LaGrande Fire Dept.
ENT	Installed evaluation and development plots
OPS	Norm Parker checking heliport sites (complete). Operations base to be Meacham airstrip
Date:	5/21/88
IC	Update 209 cost estimate to reflect budget cuts. Prepare project overview paper
ENT	Installed evaluation and development plots. Early density sampling training.
Date:	5/22/88
IC	Off duty
ENT	Off duty
OPS	Only 6 worked
Date:	5/23/88
IC	Project staff meeting
DIC	Check road closure option near airstrip. Inform residents of Hilgard of spray operation in the area.
IO	SO news release
ENT	Begin early density sampling
L/G	New management code 030001 - project fund received on Forest

Date:	5/24/88
IC	Briefing for operations crew
Safety	Dipel delivery truck caused minor damage to plank bridge on access road to airstrip
ENT	Finished early density sampling and processed samples in lab
OPS	Full operations crew training starts
L/G	Dipel delivery at Meacham airstrip
Date:	5/25/88
IC	WO delegation visit - Al West, Jim Space, Jim Stewart. Project briefing and tour project area
Safety	Larry Putlitz MVA at Meacham Store - no injuries. Close road 3032 to all project vehicles
ENT	Begin development sampling (blocks 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, and 16). Notified IC via speed memo of analysis unit qualification for treatment.
OPS	One O/P slip returned to start operations crew training. Start date projected on June 3 with two spray aircraft
Date:	5/26/88
IC	Plans for media day with Jackson and Keersmaker
Safety	Visit accident witness (Mr. Carey) at his home - minor dog bite Established a 25 mph limit for project crews in the Meacham Store area
IO	Project briefing at Walla Walla District. Project briefing at SO
ENT	Processed development samples in lab
OPS	*B.t.* delivery completed
L/G	Bridge repair completed. Change radio system and repeater on Mt. Emily
Date:	5/27/88
IC	Mid-project critique with project staff - review project status and operations to date.
DIC	Paul Joseph informed us of need for State permit to spray. Met with Dennis Perilli for details on submitting State permit.
ENT	Development sampling (blocks 6, 7, 8, 10, 11, 12, 15, 16)
OPS	Two block boundary changes for PNW fertilization work in Blocks M7C and MIDC
L/G	Prespray picnic at McKay Park

Date: 5/28/88

IC Possible Dipel viscosity problem at Newburg calibration trials. Dipel representative took viscosity test of our product.

ENT Development sampling (blocks 1, 2, 3, 4, 5, 9, 13, 14). Sampled only 1, 2, 4, and 5. Rained out on rest.

L/G Set up card reader PC

Date: 5/29/88

IC Off duty

ENT Off duty

Date: 5/30/88

IC Off duty

ENT Off duty

Date: 5/31/88

IC Dipel representative took four barrels to Newburg to check viscosity and test pumping systems.

DIC Lou Levy (Cunningham Sheep Co.) approved of bridge repairs. Visited buffalo owner (Robert Carey) to advise that Aob would be on site to watch his animals during treatment. Checked marking of no spray area in T1N R35E Sec 20

Safety Mr. Carey visited our office to pick up insurance forms

ENT Development sampling (blocks 1, 2, 3, 4, 5, 9, 13, 14 15)

OPS Release marking slip

Date: 6/1/88

IC Project staff meeting. Mark and no spray four areas - no budworm response

DIC Prepare pesticide use permit for State

ENT Development sampling (blocks 1, 2, 6, 7, 8, 10, 11, 12, 16)

OPS Change start date to June 6. Contract modification, reduce one observation aircraft. Save $20,4000. Marking aircraft released.

L/G Third radio system installed

Date:	6/2/88
IC	Plans to test our *B.t.* for contamination
ENT	Development sampling (blocks 1, 2, 3, 4, 5, 9, 13, 14, 15, 16)
Date:	6/3/88
ENT	Development sampling (blocks 1, 2, 3, 4, 5, 6, 9, 13, 14, 15)
L/G	*B.t.* samples collected for chloroform test
Date:	6/6/88
IC	Project update at SO
Safety	Minor mirror bending incident with project vehicle
ENT	Development sampling (blocks 1, 2, 3, 4, 5,6, 9, 13, 14, 15, 16)
Date:	6/7/88
IC	IC meeting at Dalles
ENT	Development sampling (blocks 1, 2, 3, 4, 7, 8, 10, 11, 12)
OPS	Crew off duty
Date:	6/8/88
IC	Met forecast from Meacham equipment on 209
ENT	Off duty - rained out
OPS	Start no sooner than June 13
Date:	6/9/88
IC	PNW visitors
Safety	No damage - vehcile contact at Safeway store parking lot. Minor paint damage at car wash.
ENT	Development sampling (blocks 1, 2, 3, 4, 5, 6, 9, 13, 14, 15, 16)
L/G	Demobilization team visit from Redmond and RO

Date:	6/10/88
IC	Notify operations crew - should start mapping Tuesday
IO	Staff visit from Senator Packwood's office (Harve Haney)
ENT	Development sampling (blocks 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 12, 13, 15, 16)
OPS	New dispatcher arrived. Plan to start spraying on June 14.
Date:	6/11/88
IO	Public open house
ENT	Development sampling (blocks 1, 2, 3, 4, 5, 6,7, 9, 10, 13, 14, 15, 16)
OPS	Three crew returned. Inform contractor of new start date of June 14.
Date:	6/12/88
IC	Examine foliage development in Block M2XD. Plan to release and spray by Tuesday
ENT	Development sampling (blocks 1, 2, 3, 6, 8, 11, 12)
OPS	Mark PNW fertilization areas. Finish reconnaissance training for aerial observers. Dipel representative arrived on site (Frank Hewitt)
Date:	6/13/88
IC	Aerial reconnaissance project area with Woody and Dayle Bennett
DIC	Brief LaGrande Ranger and FMO on project status. SO briefing. Post signs on black M2CD. Gave handout information to State Park personnel for use in campground.
IO	Briefing at SO staff meeting
ENT	Development sampling (blocks 1, 2, 3, 4, 5, 10, 14, 15, 16). Released block 2 for treatment.
OPS	Full operations crew back on site from R/R. Weather outlook good for tomorrow (go). Three spray ships on site.
Date:	6/14/88
IC	First spray day. To H-1, and H-19 with Woody
DIC	To H-1, H-2 and H-19
Safety	Two low-flying fixwing aircraft in project area during operations.
IO	Speaking engagement - Pendleton Kiwanis

ENT	Development sampling (blocks 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16)
OPS	Spray Block M2XD - 1,593 acres - Difficulty with nozzles not shutting off in turns. Spary residue buildup on skids - moved inboard nozzle out 6 inches.
Date:	6/15/88
IC	Pesticide buildup on helicopter skids.
DIC	Brief BIA and CTUIR on project activities to date
Safety	Possible vegetation damage problem in helicopter washdown area at airstrip
IO	Field tour for representative from Eastern Oregonian Newspaper staff
ENT	Released block M3XT and north end of HD. Development sampling (blocks 1, 3, 4, 5, 65, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16).
OPS	Finish block MX2D - 708 acres Replace nozzle springs to improve shut-off problem
Date:	6/16/88
IC	View operations from H-23 with Bill Ciesla
DIC	Brief CTUIR Resource Committee on project status Good coordination job to buffalo ranch - no problems.
Safety	H-23 spray ship set down on new paint parking area by mistake Diesel leak from cabover batch truck (loose cap) Cracked bug screen on project vehicle
IO	RO Review Team visit Photo and article in Eastern Oregonian
ENT	Development sampling (blocks 1, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16). Prespray sampled block 4. Released blocks 1 and 10 for treatment.
OPS	Spray block M4D = 1,488, block M3XT = 3,393. Total 4,881 Install pressure release valve.
L/G	Combined Meacham and Tollgate unit picnic at Emigrant Spring State Park campground
Date:	6/17/88
IC	Possible ATL assignment change pending
DIC	Visit State Park campground - everyone well informed Permission from Bob Messinger to leave access gate to block 6 open
Safety	No problems with campers at Emigrant Springs the day of treatment Only a few chose to leave the night before

ENT Development sampling (blocks 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16); pre-spray sampling on block 10; foliage spray deposit assessment and bioassay sampling on block 4; released blocks 6 and 7 (both controls) and 14 and 16 for treatment.

OPS Spray block M1XT - 1, 119, block M3XT 1,185 and block M4D - 3,688. Total 5,892.
Nozzle shut-off problem all OK.

Date: 6/18/88

Safety Batch truck driver's hat blown over truck

IO Walla Walla Task Force visit at H-8, and Butcher point.

ENT Development sampling (blocks 5, 8, 9, 11, 12, 15); prespray sampling on blocks 6 and 7; foliage deposit and bioassay sampling on block 10; released blocks 5 and 8 for treatment

OPS Spray block M4D - 66; block M1XT - 540; block M14XT - 1,743; block M10D 6,486; Total 8,835

L/G Mike Cavin visit

Date: 6/19/88

IC Father's Day

DIC Checked Meacham Lake area - all quiet following treatment
Check condition of Butcher Creek access road

ENT Development sampling (blocks 9, 11, 12, 13, 15); prespray sampling on blocks 5 and 8; released block 12 for treatment and block 13 (control)

OPS Spray block M4D - 1,023; block M5T - 2,400; block M8T - 1,269; block M16D - 2,517; Total 7,209

L/G Project hat and shirt orders due Friday

Date: 6/20/88

IC Travel to Dalles IC only meeting with Woody

DIC Take video of spray operation from Ob ship

Safety Post-flight inspection from transmission crack on N47035
Plastic bag blew from open batch truck door and over vehicle

IO Project briefing at SO

ENT Prespray sampling on blocks 12 and 13; foliage deposit and bioassay sampling on blocks 5 and 8; released blocks 9, 11, and 15 for treatment

OPS Spray - block M5T - 3,480; block M8T - 3,678; Total = 7,158

Date 6/21/88

IC	IC meeting at The Dalles
DIC	Eric Quaempts and I locate radio-collared elk in project area - found #461
Safety	Repairs completed on N47035 in time to spray today
ENT	Prespray sampling on block 9; foliage deposit and bioassay sampling on blocks 12 and 13
OPS	Spray block M9D - 2,880; block M12T - 4,239; block M15XD - 1,680; Total 8,799
L/G	Demobilization and transition meeting

Date: 6/22/88

IC	Possible 1st 40 OT problem for temps
ENT	Foliage deposit and bioassay sampling on blocks 9 and 12
OPS	Release 2 ob and 2 spray aircraft Spray block M8T - 420; block M9D - 3,600; block M11XT - 1,980; block M12T - 2,601; block M15 XD - 1,530; Total 10,131
L/G	Staff demobilization meeting

Date: 6/23/88

IC	Spray complete with 57,708 acres for final contract cost @ $544,106.72
ENT	Foliage deposit and bioassay sampling on block 9
OPS	Spray M9D - 1,137; block M7XT - 435; block M13XT - 720; block M12T - 210; Total = 2,502. Spraying completed 103 percent. All remaining aircraft released Final spray acres 57,708

Date: 6/24/88

ENT	Located pheromone trap sites on Watershed and Mill analysis units
OPS	Operations crew critique, release all but Operations Chief

Date: 6/25/88

IC	Release Plans Chief
Safety	Scratched right rear bumper on project vehicle
ENT	Locating areas for pheromone traps outside project area (Target and Huckleberry analysis units

Date:	6/26/88
IC	Briefing for Mary Jo Lavin and Bill Ciesla Start Incident Package preparation
OPS	Crushed rock placed over *B.t.* residue in wash-down area
L/G	Release Logistics/Finance Chief
Date:	6/27/88
OPS	Release Operations Chief
Date:	6/28/88
ENT	Start termination papers for Al Johnston; post-spray development sampling (blocks 1, 2, 3, 4, 5, 6, 7, 8 9, 10, 11, 12, 13, 14, 15, 16) Defoliation training
Date:	6/29/88
IC	Prepare larval and foliage development graphs by block and by day using Harvard Graphics on PC
Safety	Bent right side panel on project vehicle
ENT	Post-spray development sampling (blocks 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16)
Date:	6/30/88
IC	More graphs
ENT	Lower crown sampling on Target and Huckleberry analysis units.
Date:	7/1/88
IC	Prepare 209 through July 4 and sent to RO
ENT	Post-spray development sampling (blocks 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16)
Date:	7/2/88
ENT	Off duty

Date: 7/3/88

IC Off duty

ENT Off duty

Date: 7/4/88

IC Off duty

ENT Off duty

Date: 7/5/88

IC Input T/A information for correction

ENT Post-spray development sampling (blocks 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 13, 14, 16); hung pheromone traps in Meacham block 2 and Huckleberry analysis unit; post-treatment evaluation sampling on block 2.

L/G Pattie Golden to train Cheri White on lump sum and leave audits

Date 7/6/88

IC Randy and Jerry black to WW

ENT Post-treatment evaluation sampling on blocks 6 and 13; hung pheromone traps on blocks 6 and 13

Date: 7/7/88

ENT Release Bob Stevens; post-spray evaluation sampling on blocks 3, 6, 7, 13; hung phermone traps on blocks 3 and 7

Date: 7/8/88

IC Marie Claude wants to ship remainder of foliage back to Canada for processing. Estimate 16 days more work here

ENT Release Julie Weatherby; post-spray evaluation sampling on blocks 1, 4, and 14; hung pheromone traps on blocks 1, 4, and 14

Date: 7/9/88

IC Package 80 percent complete

ENT Post-treatment evaluation sampling on blocks 5, 10, and 16; hung pheromone traps on blocks 10 and 16

Date: 7/10/88

IC Off duty

ENT Post-treatment evaluation sampling on blocks 5 and 8; hung pheromone traps on blocks 5 and 8

Date: 7/11/88

IC Marie packaging foliage for return to Canada

ENT Bioassay results final. Post-treatment evaluation sampling on blocks 8, 11, and 12; hung pheromone traps on blocks 8, 11, and 12

Date: 7/12/88

IC Travel to Hood River, final project critique
Spot counting crew released

ENT Release 2; post-treatment evalution sampling on blocks 9, 12, and 15; hung pheromone traps on blocks 9, 12, and 15

Date: 7/13/88

IC Awards meeting with IC's and Woody
My evaluation by Woody and travel to Pendleton

ENT Worked in lab with post-treatment collected larvae; cleaned up flagging on development plots and barrels from landing strip; removed directional signs from field; released demobilization project equipment, supplies, and furniture.

L/G Final picnic for entomology crew, etc.

Date: 7/14/88

ENT Hung pheromone traps on Target, Watershed, and Mill analysis units

L/G Equipment and supply demobilization, packing, etc.

Date: 7/15/88

ENT Crew equipment check in; release all but four

Date: 7/16/88

IC Last T/A by Cheri White
Last 209 today
Travel to Missoula, Montana
It's over!

CHAPTER 26

PROJECT FORMS

Following are the various forms and data collection sheets used on the project. They are subdivided into functional areas as used on the project. These are ICS, operations, entomology, office, and safety.

ICS FORMS

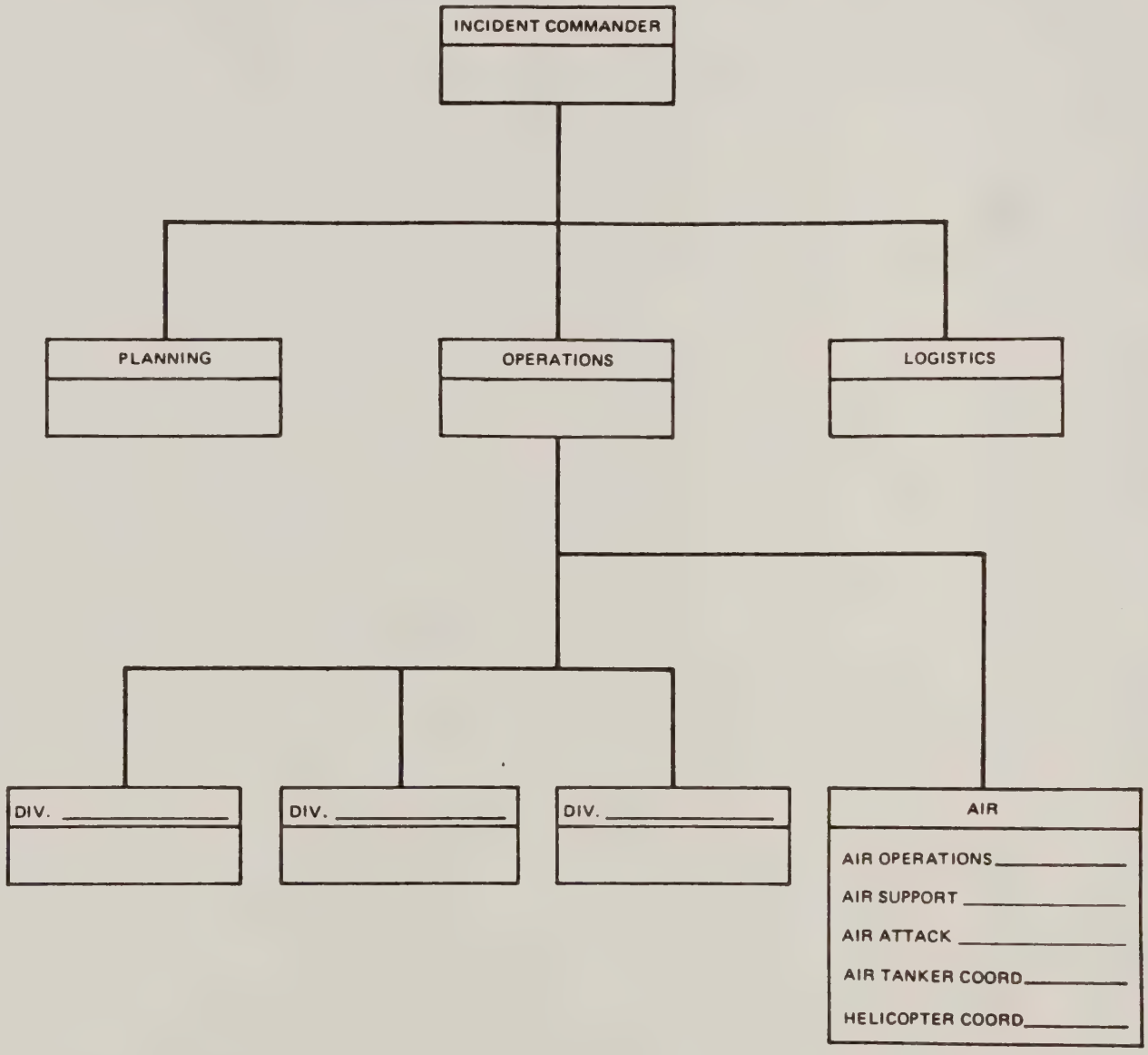
INCIDENT BRIEFING	1. INCIDENT NAME	2. DATE PREPARED	3. TIME PREPARED

4. MAP SKETCH

201 ICS 3-82	PAGE 1	8. PREPARED BY (NAME AND POSITION)

7540-130-0282

6. CURRENT ORGANIZATION



INCIDENT OBJECTIVES
ICS 202

1. INCIDENT NAME	2. DATE PREPARED	3. TIME PREPARED

4. OPERATIONAL PERIOD (DATE/TIME)

5. GENERAL CONTROL OBJECTIVES FOR THE INCIDENT (INCLUDE ALTERNATIVES)

6. WEATHER FORECAST FOR OPERATIONAL PERIOD

7. GENERAL/SAFETY MESSAGE

8. ATTACHMENTS (✓ IF ATTACHED)

- ☐ ORGANIZATION LIST (ICS 203)
- ☐ DIVISION ASSIGNMENT LISTS (ICS 204)
- ☐ COMMUNICATIONS PLAN (ICS 205)
- ☐ MEDICAL PLAN (ICS 206)
- ☐ INCIDENT MAP
- ☐ TRAFFIC PLAN
- ☐ _____
- ☐ _____
- ☐ _____

202 ICS 3-80	9. PREPARED BY (PLANNING SECTION CHIEF)	10. APPROVED BY (INCIDENT COMMANDER)

7540-130-0283

1. BRANCH	2. DIVISION/GROUP	**DIVISION ASSIGNMENT LIST**	ICS 204 (1-82)

3. INCIDENT NAME	4. OPERATIONAL PERIOD DATE _____ TIME _____

5. OPERATIONS PERSONNEL

OPERATIONS CHIEF _____ DIVISION/GROUP SUPERVISOR _____

BRANCH DIRECTOR _____ AIR ATTACK SUPERVISOR _____

6. RESOURCES ASSIGNED THIS PERIOD

STRIKE TEAM/TASK FORCE/ RESOURCE DESIGNATOR	LEADER	NUMBER PERSONS	TRANS. NEEDED	DROP OFF PT./TIME	PICK UP PT./TIME

7. CONTROL OPERATIONS

8. SPECIAL INSTRUCTIONS

9. DIVISION/GROUP COMMUNICATION SUMMARY

FUNCTION		FREQ.	SYSTEM	CHAN.	FUNCTION		FREQ.	SYSTEM	CHAN.
COMMAND	LOCAL				SUPPORT	LOCAL			
	REPEAT					REPEAT			
DIV./GROUP TACTICAL					GROUND TO AIR				

PREPARED BY (RESOURCE UNIT LDR.)	APPROVED BY (PLANNING SECT. CH.)	DATE	TIME

7540-130-0285

MEDICAL PLAN

1. INCIDENT NAME	2. DATE PREPARED	3. TIME PREPARED	4. OPERATIONAL PERIOD

5. INCIDENT MEDICAL AID STATIONS

MEDICAL AID STATIONS	LOCATION	PARAMEDICS	
		YES	NO

6. TRANSPORTATION

A. AMBULANCE SERVICES

NAME	ADDRESS	PHONE	PARAMEDICS	
			YES	NO

B. INCIDENT AMBULANCES

NAME	LOCATION	PARAMEDICS	
		YES	NO

7. HOSPITALS

NAME	ADDRESS	TRAVEL TIME		PHONE	HELIPAD		BURN CENTER	
		AIR	GRND		YES	NO	YES	NO

8. MEDICAL EMERGENCY PROCEDURES

206 ICS 8-78	9. PREPARED BY (MEDICAL UNIT LEADER)	10. REVIEWED BY (SAFETY OFFICER)

INCIDENT STATUS SUMMARY ICS 209 (1-81)

1. INCIDENT NAME	2. INCIDENT NO.	3. INCIDENT COMMANDER	4. JURIS-DICTION	5. COUNTY

6. TYPE INCIDENT	7. LOCATION	8. STARTED (DATE/TIME)

9. CAUSE	10. AREA INVOLVED	11. PERCENT CONTAINED	12. EXPECTED CONTAIN-MENT Date____ Time____	13. PERCENT CONTROLLED	14. EXPECTED CONTROL Date____ Time____

15. CURRENT THREAT	16. CONTROL PROBLEMS

17. EST. LOSS	18. EST. SAVINGS	19. INJURIES____ DEATHS____	20. LINE BUILT	21. LINE TO BUILD

22. CURRENT WEATHER		23. PREDICTED WEATHER NEXT PERIOD		24. INCIDENT COSTS—PREVIOUS DAY	25. TOTAL COST TO DATE
WS	TEMP	WS	TEMP		
WD	RH	WD	RH		

26. AGENCIES / 27. RESOURCES																					TOTALS	
KIND OF RESOURCE	INC	ST	INC	ST	INC	ST	INC	ST	INC	ST	INC	ST	INC	ST	INC	ST	INC	ST	INC	ST	INC	ST
ENGINES																						
DOZERS																						
CREWS																						
HELICOPTERS																						
AIR TANKERS																						
TRUCK COS.																						
RESCUE/MED.																						
WATER TENDERS																						
OVERHEAD PERSONNEL																						
TOTAL PERSONNEL																						

28. COOPERATING AGENCIES

29. REMARKS

30. PREPARED BY	31. APPROVED BY	32. DATE____ TIME____	33. INITIAL ☐ UPDATE ☐ FINAL ☐	34. SENT TO: DATE____ TIME____ BY____

7540-130-0289

CHECK-IN LIST ICS 211 (1-82)

1. INCIDENT NAME

2. CHECK IN LOCATION
☐ BASE ☐ CAMP _____ ☐ STAGING AREA ☐ ICP RESTAT ☐ HELIBASE

3. DATE/TIME

CHECK-IN INFORMATION

4. LIST PERSONNEL (OVERHEAD) BY AGENCY AND NAME LIST EQUIPMENT BY THE FOLLOWING FORMAT:					5.	6.	7.	8.	9.		10.	11.	12.	13.	14.	15.	16.
AGENCY	SINGLE T/F S/T	KIND	TYPE	ID. NO./NAME	ORDER/ REQUEST NUMBER	DATE/TIME CHECK-IN	LEADER'S NAME	TOTAL NO. PERSONNEL	MANIFEST YES	NO	CREW WEIGHT OR INDIVIDUALS WEIGHT	HOME BASE	DEPARTURE POINT	METHOD OF TRAVEL	INCIDENT ASSIGNMENT	OTHER QUALIFICATION	SENT TO RESTAT TIME/INT.

PAGE of

18. PREPARED BY (NAME AND POSITION) USE BACK FOR REMARKS OR COMMENTS

UNIT LOG ICS-214	1. INCIDENT NAME	2. DATE PREPARED	3. TIME PREPARED

4. UNIT NAME/DESIGNATOR	5. UNIT LEADER (NAME AND POSITION)	6. OPERATIONAL PERIOD

7. PERSONNEL ROSTER ASSIGNED

NAME	ICS POSITION	HOME BASE

8. ACTIVITY LOG (CONTINUE ON REVERSE)

TIME	MAJOR EVENTS

7540-130-0293

OPERATIONAL PLANNING WORK SHEET

1 INCIDENT NAME

2 DATE PREPARED

TIME PREPARED

3 OPERATIONAL PERIOD (DATE/TIME)

4 DIVISION/GROUP OR OTHER LOCATION	5 WORK ASSIGNMENTS		RESOURCES BY TYPE (SHOWN STRIKE TEAM AS ST)																		OTHER	7 REPORTING LOCATION	8 REQUESTED ARRIVAL TIME
			ENGINES				WATER TENDERS		HAND CREWS		DOZERS			HELICOPTERS				AIR TANKERS					
			1	2	3	4	1	2	1	2	1	2	3	1	2	3	4	1	2	3			
		REQ.																					
		HAVE																					
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	9 TOTAL RESOURCES REQUIRED	SINGLE RESOURCES / STRIKE TEAMS																				PREPARED BY (NAME AND POSITION)	
	TOTAL RESOURCES ON HAND																						
215 ICS 3-82	TOTAL RESOURCES NEEDED																						7450-130-0294

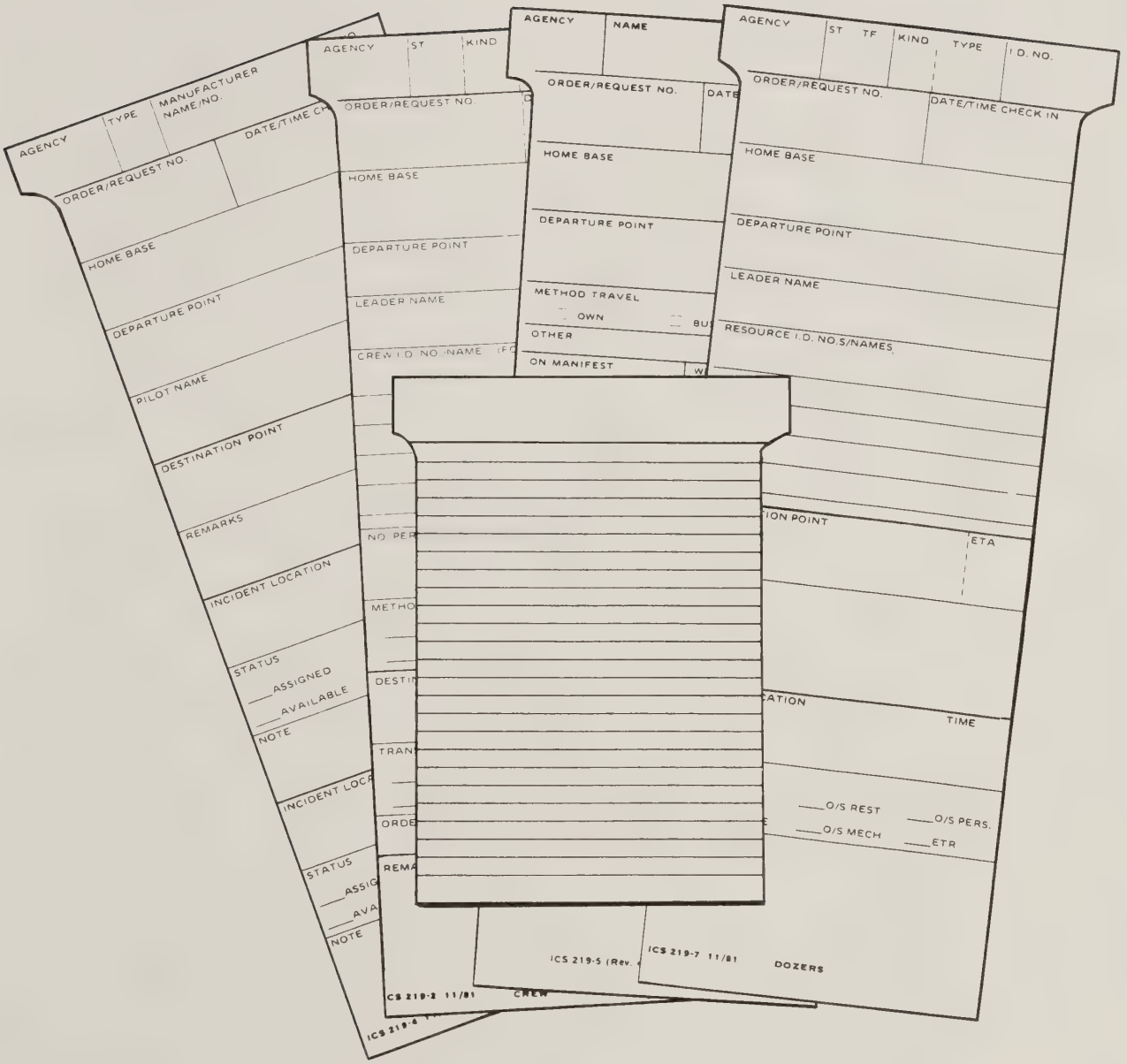
RADIO FREQUENCY ASSIGNMENT WORKSHEET

1 INCIDENT NAME	2 DATE	3 OPERATIONAL PERIOD (DATE/TIME)

5 RADIO DATA / 4 INCIDENT ORGANIZATION				BRANCH	DIVISION/GROUP	DIVISION/GROUP	DIVISION/GROUP	BRANCH	DIVISION/GROUP	DIVISION/GROUP	DIVISION/GROUP	BRANCH	DIVISION/GROUP	DIVISION/GROUP	DIVISION/GROUP	INCIDENT COMMANDER	SAFETY OFFICER	OPERATIONS CHIEF	AIR OPERATIONS DIRECTOR	AIT ATTACK SUPERVISOR	PLANNING SECTION CH.	SITUATION UNIT	SITSTAT LEADER	LOGISTICS SEC. CH.	GROUND SUPPORT UNIT LEADER	FACILITIES UNIT							COMM. CENTER	TOTAL BY FREQ.
CACHE	FUNCTION	CH#	FREQUENCY																																	
USFS BOISE RADIO CACHE		1	168.050																																	
		2	168.200																																	
		3	168.600																																	
		4																																		
		5																																		
		6																																		
USFS REGION CACHE		1	168.050																																	
		2	168.200																																	
		3	169.925																																	
		4	T 170.525 R 169.925																																	
		5	168.625																																	
FIRE-MARS		1	154.280																																	
		2	154.295																																	
		3	T 153.830 R 154.295																																	
		4																																		
		5																																		
AGENCY ID	FUNCTION	CH#	FREQUENCY																																	
7 TOTAL RADIOS REQUIRED																																			

217 ICS 3-82	7540-130-0296	8 PREPARED BY (NAME/POSITION)

SAMPLES OF
RESOURCE STATUS CARDS
ICS 219



OPERATION FORMS

HELIPORT OR AIRSTRIP PRE-FLIGHT CHECKLIST

Report by:_____

Date: _____

Heliport Location:_____

Aircraft Registration Numbers: Spray Ship(s):_____

Observer Ships:_____

On Aircraft:

____Check seating of trap-door on insecticide tank.("Quick-Dump Door")
____Check plumbing joints for leaks on all boom parts -especially those parts closest to the ground.(Visual check)
____Make sure a guard is in place of the "quick-release" switch.
____Make sure drain on insecticide tank is closed.(Previous day's operation may have left it open after tank was cleaned.)
____Know maximum tank loads. Monitor to prevent overloads.
____Aircraft is free of loose items. (tools, windex, rags, etc.)

On Tank Trucks:

____Visually check fuel truck for leaks. (Hose, fittings, tanks.)
____Inspect batch covers on nurse-trucks and batch trucks. Covers must be secured prior to moving trucks form landing or from batch area.

On Landing and Airstrip:

____Heliport or Airstrip is clear of loose items and debris.
____Tailgate safety meeting or equivalent was held to remind team members of specific concerns. Must be documented daily and submitted to Safety.
____Check radio communications with base camp.
____Application Team Leader has radio communications with Aerial Observer.
____Aerial Observer has radio communications with spray ship pilot.
____Spill containment equipment is on landing prior to any fuel or insecticide handling.
____"People barriers" are in place where needed to separate the public from hazards.
____Contractor and project personnel at this location appear alert and ready for day's operations. (Pilots, tank-truck drivers, service personnel).
____Vehicles are parked to prevent conjestion at heliport or Airstrip.
____Personal protective gear is in use.
____Pilot and Aerial Observer briefed of hazards.

NOTE: This checklist is to be completed each morning by each team. Many of these items will need to be monitored througout the operation time period. Submit a Xeroxed copy of completed form to Safety Section.

U.S. DEPARTMENT OF THE INTERIOR
OFFICE OF AIRCRAFT SERVICES

HELICOPTER POWER CHECK
TURBINE ENGINE

Pilot:	Model:
Date:	FAA No.:
Hr. Meter:	Eng. No.:
	Contractor:

Helicopter

TYPE

*ITEM	VALUE
OAT	
Press. Altitude	
Torque or Pitch Indications:	
N1—Compressor	
N2—Power Turbine	
EGT	
TOT	
TPT	
ITT	
Correction Factor	

Type of Check:

Performance Reading:

Chart Reading:

Margin Difference:

*Use only items applicable to type of helicopter

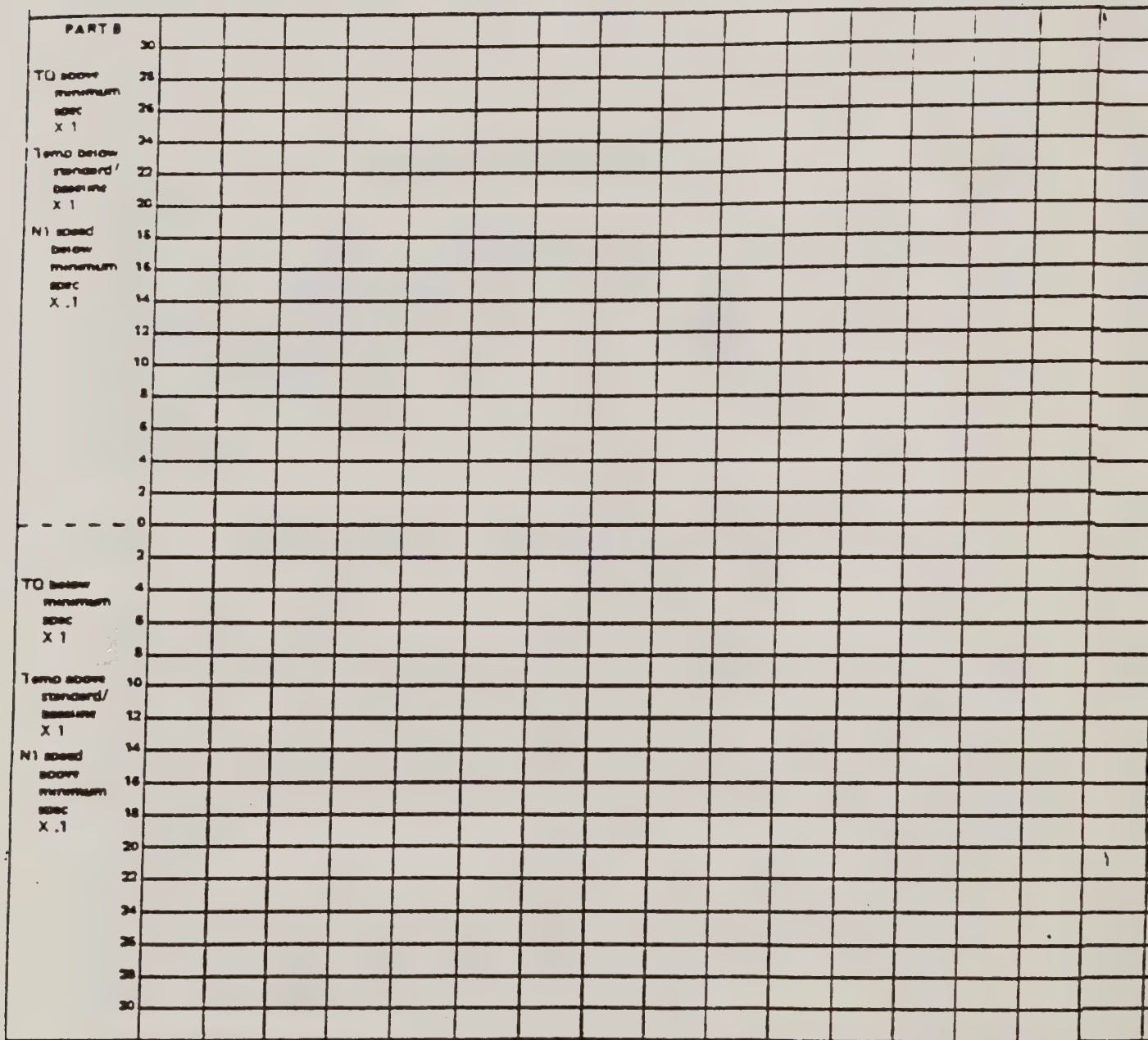
☆ GPO 794-413

TURBINE ENGINE PERFORMANCE ANALYSIS

HELICOPTER #: _____ MONTH: _____ YEAR: _____

MODEL : _____

ENGINE #: _____



PART A
PRESS ALT
TORQUE
N1-NG
ITT-TOT-EGT-TIT
OAT
HOUR METER
DATE

INSTRUCTIONS: Part A: Transferred data from form FS-5700-22, power check data card. Calculate correction from standard/base line by consulting the appropriate flight manual power check charts and FSH 5709.12.

USDA-FOREST SERVICE

HELICOPTER LOAD CALCULATION

(Ref. FSH 5709.12)		HELICOPTER NO. & MODEL	
PILOT		DATE	
PROJECT		TIME	
1a. DEPARTURE BASE	1b. PRESSURE ALT.	1c. TEMPERATURE	
2a. DESTINATION	2b. PRESSURE ALT.	2c. TEMPERATURE	
3. HELICOPTER EQUIPPED WEIGHT			
4. FLIGHT CREW WEIGHT			
5. FUEL *(Gal._____x_____/lbs.)*			
6. OPERATING WEIGHT *(3 + 4 + 5)*			
		HIGE	HOGE
7. COMPUTED GROSS WEIGHT			
8. WEIGHT REDUCTION			
9. ADJUSTED WEIGHT *(7 minus 8)*			
10. TAKEOFF AND LANDING LIMITS *(Handbook, Limitation Section)*			
NOTE: USE LOWEST WEIGHT *(9 or 10)* FOR NONJETTISONABLE LOADS.			
11. SELECTED WEIGHT *(From 9 or 10)*			
12. OPERATING WEIGHT *(Line 6)*			
13. ALLOWABLE PAYLOAD *(11 minus 12)*			
14. PASSENGERS AND/OR CARGO:			
15. ACTUAL PAYLOAD			
16. ACTUAL GROSS WEIGHT *(12 plus 15)* *(Must not exceed 11)*			
HELICOPTER FOREMAN *(Signature)*			
PILOT *(Signature)*			

FS-5700-17 (5/81)

U.S. DEPARTMENT OF AGRICULTURE
Forest Service

CONTRACT DAILY DIARY

(Reference FSH 6309.11)

PAGE ___ of ___

1. FOREST	2. CONTRACT NO.	3.PROJECT
4. CONTRACTOR	5. CONTRACTOR REPRESENTATIVE ON SITE	
6. GOVERNMENT OFFICIALS ON SITE		

7. DATE	8. DAY OF WEEK	9. TIME ARRIVED	10. TIME DEPARTED	11. WEATHER

12. TEMPERATURE °F. Min. Max.	13. GROUND CONDITION	14. CONTRACT TIME	15. DAYS USED	16. COMPLETION DATE

17. TIME USED (%)	18. WORK COMPLETED (%)	19. WORK ON SCHEDULE ☐ YES ☐ NO	20. CONTRACTOR'S WORK (X Appropriate Box) ☐ Acceptable ☐ Unacceptable - Explain in narrative

21. CHANGE ORDERS/AMENDMENTS ISSUED	22. WORK ORDERS ISSUED (Include SUSPEND/RESUME)

23. MATERIALS FURNISHED TO JOB SITE (Furnished By: G-Govt.; C-Cont.; S-Subcont.)		24. LIST EQUIPMENT ON SITE (Furnished By: G Govt.; C Cont.; S Subcont.) Type	Contract Item Number and Location of Use	Hours Used	

25. LIST CONTRACT PAYMENTS, REPORTS, CORRESPONDENCE, ETC. Item	Prep	Submit	26. WORKERS ON SITE Classification	Number PRIME	SUB

27 GOVERNMENT PROVIDED SERVICES ADEQUATELY AND TIMELY
☐ YES ☐ NO - Explain in narrative

28. NARRATIVE REPORT

29. SIGNATURE	30. TITLE	31. ADDTL SPACE NEEDED ☐ (continued on 6300-21)

Distribution: Original - CO (weekly); copies: COR, SO, PROJ ENG
Previous editions of this form are obsolete.

☆U.S.GPO: 1981 338-801

FS-6300-20 (1/78)

USDA-Forest Service **CONTRACT DAILY DIARY** Narrative Continuation (Reference FSH 6309.11)	1. PROJECT	2. PAGE ___ of ___
	3. CONTRACT NUMBER	4. DATE

5. NARRATIVE REPORT (continued from 6300-20)

6. SIGNATURE	7. TITLE	8. ADDTL SPACE NEEDED ☐ (continued on 6300-21) On page ___ of ___

Distribution: Original - CO (weekly); copies; COR, SO, PROJ ENG

6300-21 (1/78)

Previous editions of this form are obsolete

USDA-FOREST SERVICE

FLIGHT USE REPORT

(Ref. FSM 5718.2)

1. DATE OF FLIGHT (MO DA YR)	2. CONTRACT OR RENTAL AGREEMENT NO.	3. SUPPLYING UNIT CODE	4. SUPPLYING UNIT NAME	5. REGION/FOREST USE
/ /				

6. VENDOR *(NAME AND ADDRESS)*	7. PILOT'S NAME *(LAST, FIRST, MI)*	8. AIRCRAFT MAKE	9. AIRCRAFT MODEL
	A.		
	B.	10. FS A/C TYPE *(H, T, or F)* / 11. SINGLE OR MULTI ENGINE *(S or M)*	12. FAA NUMBER N	13. FIRE ORDER NO./FLIGHT NO.

14. LINE NO	15. USER UNIT	16. USER CODE	17. FIRE NAME OR PROJECT NUMBER	18. FLIGHT ORIGIN AND DESTINATION	19. USAGE CODE	20. TRAINING	21. PILOT A or B	22. NO. OF CREW MEMBERS	23. NO. OF PASSENGERS	24. NO. OF JUMPERS DROPPED	25. CARGO TYPE P, S or L	26. CARGO LBS	27. RETARDANT W, L or S	28. RETARDANT GALLONS	29. CLOCK TIME START	29. CLOCK TIME STOP	30. FLIGHT HOUR METER START	30. FLIGHT HOUR METER STOP	31. ELAPSED TIME HRS & TENTHS OR HRS & MINS	32. RATE	33. FUEL COST PER GALLON AIRTANKER	34. CHARGES
				FROM																		
1				TO																		
2				TO																		
3				TO																		
4				TO																		
5				TO																		
6				TO																		
7				TO																		
8				TO																		
9				TO																		
10				TO																		

35. ACCOUNTING SUMMARY

LINE NO	NFC FUND CODE	UNIT	MANAGEMENT CODE	FY	BUDGET OBJECT	AMOUNT	LINE NO	NFC FUND CODE	UNIT	MANAGEMENT CODE	FY	BUDGET OBJECT	AMOUNT

36. TOTAL CHARGES	.
37. OVERNIGHT CHARGES LOCATION: _____ NO. OF CREW MEMBERS _____ RATE _____	.
38. SERVICE TRUCK CHARGES MILES _____ RATE _____	.
39. OTHER CHARGES OR CREDITS	.
40. TOTAL OF ALL CHARGES	.

41. REMARKS

Sequence No. 457101

42. TRANS TYPE C D

43. I CERTIFY THAT SERVICES LISTED ABOVE HAVE BEEN RECEIVED. SIGNATURE AND TITLE OF FOREST SERVICE OFFICER

44. I CERTIFY THAT SERVICES LISTED ABOVE HAVE BEEN PROVIDED. SIGNATURE AND TITLE OF VENDOR OR AGENT

PREVIOUS EDITION OF THIS FORM IS OBSOLETE.

FS-6500-122 (10/81)

U.S. DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
PLANT PROTECTION AND QUARANTINE PROGRAMS

DAILY AIRCRAFT RECORD

DATE

NAME & ADDRESS OF CONTRACTOR

CONTRACT NO.	PEST	STATE	COUNTY	UNIT	BLOCK

AIRCRAFT TYPE AND NO.

AIRCRAFT TYPE AND NO.

TRIP	TAKE-OFF	LANDING	MIN.	GAL./LBS.	ACRES	TRIP	TAKE-OFF	LANDING	MIN.	GAL./LBS.	ACRES
1						1					
2						2					
3						3					
4						4					
5						5					
6						6					
7						7					
8						8					
9						9					
10						10					
		TOTALS						TOTALS			

COMMENTS *(Record all periods of shutdown and reasons therefor; if shutdown is caused by an aircraft, be sure to identify the aircraft by number).*

SIGNATURE OF GUIDANCE CONTRACTOR'S REPRESENTATIVE

SIGNATURE OF TIMEKEEPER

SIGNATURE OF APPLICATION CONTRACTOR'S REPRESENTATIVE

PPQ FORM 802
MAY 1974

REPLACES PPC FORM 8-2 (4/69), WHICH MAY BE USED.

AERIAL INSECTICIDE APPLICATION DAILY FLIGHT RECORD

Unit _____ Block No. _____ Flight Date _____

Helicopter No. _____ Pilot _____ Max. Load Gallons _____

Load Checker _____ Heliport Manager _____ Heliport No. _____

Flight No.	Time			Gallons of Spray Material				Weather		
	Take Off	Landing	Flight	Meter Readings Start	End	Per Load	Cumulative Total Sprayed		Temp Humidity	Wind Speed Direction	TIM

DAILY TOTALS

Cumulative Total Gallons Sprayed _____

Number Acres Sprayed _____

CHECKED AND CERTIFIED CORRECT

Load Checker _____

Pilot _____
(initial)

USDA - Forest Service **Aircraft Initial Report** *(Ref. FSM 5714)*	Type of Report *(x appropriate box)* ☐ Incident ☐ Accident	1. REGION	2. REPORT DATE

INSTRUCTIONS: *Regions will submit this report to Aviation and Fire Management Staff, WO, within 48 hours after a non-fatal aircraft accident. Make an initial report for all fatal aircraft accidents by telephone within 24 hours to the Director, Personnel Management, WO.*

3. DATE AND TIME OF ACCIDENT	4. WHERE DID ACCIDENT OCCUR? *(Location)*

5. AIRCRAFT IDENTIFICATION	A. MAKE	B. MODEL	C. REGISTRATION NO.
	D. TYPE AND MODEL OF ENGINE(S)		E. OWNER'S NAME:

6. PERSONNEL	A. LIST NAME OF PILOT AND PASSENGERS:

7. DEATHS AND INJURIES	A. LIST NAMES OF PERSONS KILLED OR INJURED, AND INDICATE EXTENT OF INJURIES:

8. MISSION *(Purpose for which aircraft was being used)*:

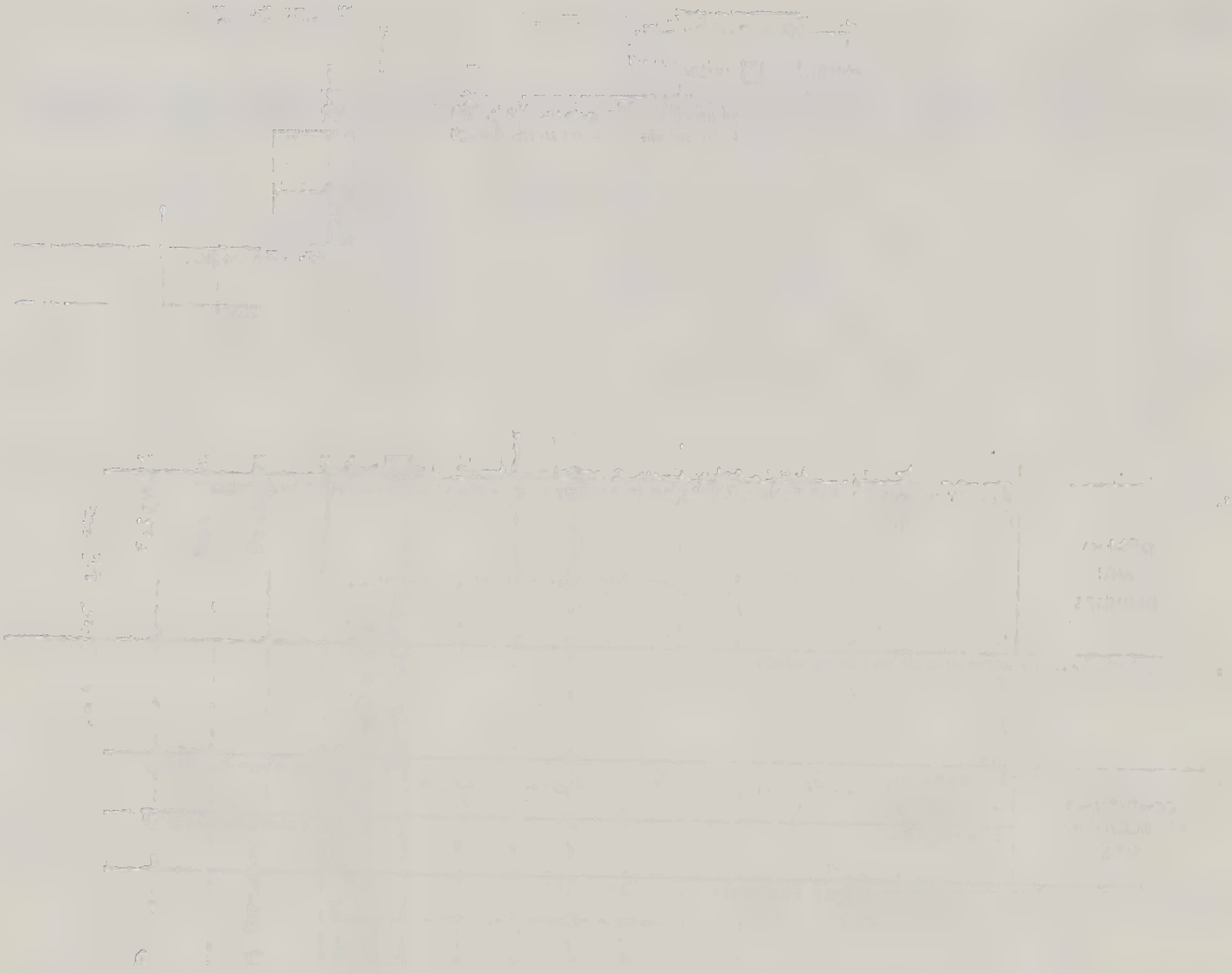
9. CONDITIONS AT ACCIDENT SITE	A. TERRAIN:	B. ELEVATION *(MSL)*:
	C. WEATHER:	D. TEMPERATURE- *(F)*

10. BRIEF RESUME AND POSSIBLE CAUSE OF ACCIDENT

11. EXTENT OF DAMAGE:

12. REMARKS:

REPORTED BY *(Name and Title)*	DATE



MEACHAM PILOT PROJECT
SPRUCE BUDWORM 1988

HELISPOTS AND HELIPORTS

DATE LAST REVISION:	REVISED BY:

TWP	RANGE	SECTION	SUBDIV

LAT:_____ LONG:_____

LANDOWNER:_____

CONDITIONS OF USE:

HELISPOT HELIPORT NO.:

NAME:

SURFACING: _____

ACCESS:

APPROVED BY:

ELEVATION: _____ ASPECT:_____ BLOCK #:_____

SITE CAN HANDLE:
SMALL _____ (1-4 PLACE) MEDIUM _____ (5-15 PLACE)

SITE APPROVED FOR:
APPLICATION _____
OBSERVATION _____

APPROACH PATTERN IF RESTRICTED: _____

ROAD INTERSECTIONS MARKED: _____ YES _____ NO

SITE NUMBERED ON GROUND (VISIBLE FROM AIR): _____ YES _____ NO

HAZARDS (TIMBER, POWERLINES, ETC.): _____

REMARKS:

MAP OF IMPROVEMENTS NEEDED AND TIME TO CONSTRUCT ON REVERSE

PROJECTED SPRAY PLAN FOR _____(DATE)

Team Leader _____ AEM _____ Ground Observer_____

	HELISPOT/ AIRPORT	SPRAY AIRCRAFT	OBSERV. AIRCRAFT	AERIAL OBSERV.	BLOCK #	RADIO FREQUENCY
1.						
2.						
3.						
4.						

REMARKS: (card checkers, etc.)_____

_____

_____

PROJECTED SPRAY PLAN FOR _____(DATE)

Team Leader _____ AEM _____ Ground Observer_____

	HELISPOT/ AIRPORT	SPRAY AIRCRAFT	OBSERV. AIRCRAFT	AERIAL OBSERV.	BLOCK #	RADIO FREQUENCY
1.						
2.						
3.						
4.						

REMARKS: (card checkers, etc.)_____

_____

_____

PROJECTED SPRAY PLAN FOR _____(DATE)

Team Leader _____ AEM _____ Ground Observer_____

	HELISPOT/ AIRPORT	SPRAY AIRCRAFT	OBSERV. AIRCRAFT	AERIAL OBSERV.	BLOCK #	RADIO FREQUENCY
1.						
2.						
3.						
4.						

REMARKS: (card checkers, etc.)_____

_____

_____

Form 28

AERIAL OBSERVATION REPORT

Western Spruce Budworm Project

UNIT _____

1. Spray Helicopter No. _____ Pilot _____ Spray Block #_____ Time _____

2. Swath Width _____

3. Spray Plane Height _____

4. Leaks or Plugged Nozzles _____

5. Spray Action & Time Observed _____

6. Spray Pattern Near Non-Spray Areas (lakes, streams, etc.) _____

_____

7. Is spray plane in proper block, pilot oriented, etc. _____

_____

8. Stop watch time for spraying load: Minutes _____ Seconds _____
Minutes _____ Seconds _____
Minutes _____ Seconds _____

Observer _____

Observation Ship #_____

Date _____

FIELD WEATHER REPORT FORM

UNIT____________________ BLOCK____________________ OBSERVER____________________

LOCATION____ ELEVATION____________________

		WIND		RELATIVE HUMIDITY			
DATE	TIME	SPEED	DIRECT	WET	DRY(Temp)	%	REMARKS

1988 Meacham Spruce Budworm

SPRAY DEPOSIT ASSESSMENT FORM #1

CARD CREW _____ DATE TREATED _____

SPRAY SHIP TAIL NUMBER _____ SPRAY BLOCK _____

Plot or
CARD LINE NUMBER _____ Chemical _____

CARD #	APPARENT SPRAY DEPOSIT YES	NO	DEPOSIT CLASS	DROPLET DENSITY /sq cm	COMMENTS
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

PER CENT OF CARDS SPRAYED

MEAN DROP DENSITY PER SQ. CENTIMETER

DEPOSIT CLASS

0 - None
1 - VERY LIGHT
2 - MODERATE
3 - ADEQUATE

_____
APPLICATION TEAM LEADER

MAP TO PLOT LOCATION ON BACK

DAILY ACCOMPLISHMENT REPORT

DATE: _____

PROJECT: _____ TEAM: _____

Bid Item	Spray Block	Application Number	Gallons Applied	Acres Treated	Total Block Acres	Est. % Complete To Date	FAA Ship #	Batch #

AIRCRAFT OPERATION TIME

FAA Ship #	Task	Avail. Time	Actual Time	Tack Time	Bid Item #	Comments

Form 9120–1
(December 1964)
(formerly 4–1449)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

RADIO STATION LOG

CODE	Location	Radio Call Sign
RD – Radio Telephone LL – Landline Telephone VB – Verbal Message MS – Messenger Service		
	Transmitting Freqs: (circle) F_1, F_2, F_3, F_4,	Date

TIME (0001–2400)	STATION CALLED OR CALLING	INFORMATION	OPERATOR INITIAL

DISPATCH LOG

DATE _____

TIME	CALLER	MESSAGE

BATCH TRUCK RECORD

TRUCK ID:______________________________

DATE	TIME	BATCH NUMBER	MMM READING	AIRCRAFT RECEIVING	VEHICLE RECEIVING	GALLONS IN	GALLONS OUT	GALLONS AVAILABLE

Truck ID# _____

BATCH TRUCK RECORD

Date	Beginning and Age C-1	C-2	C-3	C-4	Gallons Added And Age C-1	C-2	C-3	C-4	Gallons Used C-1	C-2	C-3	C-4	Ending Gallons And Age C-1	C-2	C-3	C-4	Total Gallons	Remarks

PROJECT PILOT FLIGHT DUTY RECORD

PILOT NAME: _____

DATE ASSIGNED TO PROJECT: _____

MAY

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	1 JUNE	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

MAP REQUEST FORM

MAPS WANTED	# WANTED	DATE WANTED	BY WHOM	DATE RECEIVED	# RECEIVED

B.t. Sample

Incident _____ Storage Site _____

Product _____ Batch or Production Number _____

EPA Establishment Number _____

Date Delivered _____ Date Sampled _____

Sample Type: Tank Truck _____ Barrel _____ Storage Tank _____

Truck-Trailer ID _____ Top Sample _____ Bottom Sample _____

Unloaded into Storage Tank ID _____

Barrel ID _____

Storage Tank ID ___ Top Sample ____ Bottom Sample ___ Days Stored ____

Collector _____

Remarks _____

VISUAL SIGNAL CODE

U.S. Forest Service—Visual Signal—Ground to Air

Change Jump Spot ..... J
Cargo Drop Target (form numeral to identify targets when several in same vicinity ..... T or T_2
Helicopter Landing Spot (form numeral to identify spot when several in same vicinity) ..... H or H_3
Need Cross-Cut Saw ..... S
Need Power Saw ..... SS
Need Climbers ..... O
Need Drinking Water ..... U
Need Food ..... F
Need Radio With Batteries ..... R
Need Batteries for Radio ..... RR
Need Hand Pump ..... P
Need Power Pumper Outfit ..... PP
Need More Help (form numerals for 2 or more men) 2
Fire Manned Adequately ..... ▼
Jumper OK (Parachute and L) L
Personnel OK LL
Able to Ride Horse 2
Need Stretcher Crew 3
Broken Leg 4
Broken Arm 5
Broken Back 6
Head Injury 7
Puncture Wound 8
Unable to Diagnose 9
Received Message—Wave Streamer

FS-5700-1(3.84)

FAA GROUND-AIR VISUAL CODE FOR USE BY SURVIVORS. (USED BY FOREST SERVICE)

NO.	MESSAGE	CODE SYMBOL
1	Require assistance	V
2	Require medical assistance	X
3	No or Negative	N
4	Yes or Affirmative	Y
5	Proceeding in this direction	↑

IF IN DOUBT, USE INTERNATIONAL SYMBOL SOS INSTRUCTIONS

1. Lay out symbols by using strips of fabric or parachutes, pieces of wood, stones, or any available material.
2. Provide as much color contrast as possible between material used for symbols and background against which symbols are exposed.
3. Symbols should be at least 10 feet high or larger. Care should be taken to lay out symbols exactly as shown.
4. In addition to using symbols, every effort is to be made to attract attention by means of radio, flares, smoke, or other available means.
5. On snow covered ground, signals can be made by dragging, shoveling or tramping. Depressed areas forming symbols will appear black from the air.
6. Pilot should acknowledge message by rocking wings from side to side.

USFS AIR TO GROUND SIGNALS
Received Message—Rock plane
Will Drop Message—Gun motor three times
Fire Here—Circle three times over spot

UMATILLA MOBILIZATION PLAN

LEGAL FLYING TIME TABLE

1/2 Hour Before Sunrise - 1/2 Hour After Sunset
Pendleton, Oregon

	MAY		JUNE		JULY		AUGUST	
Date	Rise	Set	Rise	Set	Rise	Set	Rise	Set
1	0513	2032	0439	2107	0440	2118	0508	2054
2	0512	2034	0439	2108	0440	2118	0509	2053
3	0510	2035	0438	2109	0441	2118	0511	2052
4	0509	2036	0438	2110	0441	2118	0512	2050
5	0508	2037	0437	2111	0442	2117	0513	2049
6	0506	2039	0437	2111	0443	2117	0514	2047
7	0505	2040	0437	2112	0443	2117	0515	2046
8	0503	2041	0436	2113	0444	2116	0517	2045
9	0502	2042	0436	2113	0445	2116	0518	2043
10	0501	2044	0436	2114	0446	2115	0519	2042
11	0459	2045	0436	2115	0447	2115	0520	2040
12	0458	2046	0435	2115	0447	2114	0521	2038
13	0457	2047	0435	2116	0448	2113	0523	2037
14	0456	2048	0435	2116	0449	2113	0524	2035
15	0454	2050	0435	2117	0451	2112	0525	2034
16	0453	2051	0435	2117	0451	2111	0526	2032
17	0452	2052	0435	2117	0452	2110	0528	2030
18	0451	2053	0435	2118	0453	2109	0529	2029
19	0450	2054	0435	2118	0454	2109	0530	2027
20	0449	2055	0435	2118	0455	2108	0531	2025
21	0448	2056	0436	2118	0456	2107	0533	2024
22	0447	2057	0436	2119	0457	2106	0534	2022
23	0446	2059	0436	2119	0458	2105	0535	2020
24	0445	2100	0436	2119	0459	2104	0536	2018
25	0444	2101	0437	2119	0500	2103	0537	2017
26	0444	2102	0437	2119	0501	2102	0539	2015
27	0443	2103	0438	2119	0503	2100	0540	2013
28	0442	2104	0438	2119	0504	2059	0541	2011
29	0441	2105	0438	2119	0505	2058	0542	2009
30	0441	2105	0439	2119	0506	2057	0544	2008
31	0440	2106			0507	2056	0545	2006

Daylight Saving Time & Pacific Standard Time has been compensated for on last Sunday in April, and the last Sunday in October.

June 11, 198

MEACHAM PILOT PROJECT

GALLONS OF SPRAY PER MINUTE TABLE

(4.45 GALLONS PER MINUTE)

GALLONS	- 5 % MIN/SEC	BASE MIN/SEC	+ 5 % MIN/SEC
100	21.21	22.28	23.35
95	20.49	21.06	22.17
90	19.13	20.13	21.13
85	18.21	20.05	20.01
80	17.11	17.59	18.47
75	16.14	16.57	17.40
70	14.67	15.44	16.21
65	13.65	14.37	15.09
60	13.03	13.29	14.36
55	12.01	12.22	13.24
50	10.58	11.14	11.70
45	9.57	10.07	10.57
40	8.16	8.59	9.02
35	7.14	7.52	8.30
30	6.12	6.44	7.16
25	5.10	5.37	6.04
20	4.08	4.29	4.50
15	3.06	3.22	3.38
10	2.04	2.15	2.26
5	1.02	1.07	1.12

ENTOMOLOGY FORMS

BIO. FORM NO. 1
FIELD DATA COLLECTION FORM

AU NAME_____

BLOCK No._____

PLOT No._____

TYPE SURVEY_____
(dens, devel, eval, egg mass)

ELEVATION_____feet

COLLECTORS_____
(Last Names)

DATE COLLECTED____/____/____
(mm / dd / yy/)

TREE No._____

BRANCH No._____

** WESTERN SPRUCE BUDWORM PROJECT **

EARLY LARVAL DENSITY DATA ENTRY SHEET

FOREST CODE __ AU NUMBER ___ DATE SAMPLED __/__/__ (mm/dd/yy)

BLOCK NUMBER ___ PLOT NUMBER ___ TREE SP. (DF,TF) __

TREE NUMBER	BRANCH NUMBER	---NO. of LARVAE-- BUDWORM	OTHER	NO. of BUDS
1	1	___	___	___
2	1	___	___	___
3	1	___	___	___

EXAMINER (last name)_____

COMMENT:_____

_____

_____

_____

_____

R6FPM (4/87) (Database = **EDENSITY**)

TREATMENT BLOCK RELEASE FORM BIO. FORM NO. 3

ANALYSIS UNIT NAME: _____

BLOCK NUMBER	PROJECTED RELEASE DATE MM/DD/YY	ACTUAL RELEASE DATE MM/DD/YY	PERCENT L2 + L3 AT RELEASE	PERCENT SHOOTS UNFURLED	DATE TO BE TREATED BY MM/DD/YY	FIRST DATE RESAMPLED MM/DD/YY	PERCENT PUPAE	SECOND DATE RESAMPLED MM/DD/YY	PERCENT PUPAE
	/ /	/ /			/ /	/ /		/ /	
	/ /	/ /			/ /	/ /		/ /	
	/ /	/ /			/ /	/ /		/ /	
	/ /	/ /			/ /	/ /		/ /	
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	/ /	/ /			/ /	/ /		/ /	
	/ /	/ /			/ /	/ /		/ /	
	/ /	/ /			/ /	/ /		/ /	

RELEASED BY: _____

TITLE: _____

TREATMENT BLOCK RELEASE FORM

ANALYSIS UNIT NAME _____

RELEASED ON: DATE __/__/__ (mm/dd/yy) TIME_____ (24-hr)

TO BE TREATED BY: DATE __/__/__ (mm/dd/yy) TIME_____ (24-hr)

SPRAY BLOCK NO.	-------PERCENT-------- 2ND + 3RD INSTARS	BUDS UNFURLED

RELEASED BY _____

TITLE _____

R6FPM (4/87) BIO. FORM NO. 4

BUDWORM DEVELOPMENT PLOT DATA SHEET

FOREST CODE __ AU NUMBER ___ DATE SAMPLED __/__/__ (mm/dd/yy)

BLOCK NUMBER ___ PLOT NUMBER ___ TREE SP. = DF, TF, or SP

TREE SP.	TOTAL SHOOTS	SHOOTS UNFURLED	SBW INSTARS					SBW PUPAE	TOTAL BUDWORM	OTHER LARVAE
			2nd	3rd	4th	5th	6th			
__	___	___	___	___	___	___	___	___	___	___
__	___	___	___	___	___	___	___	___	___	___
__	___	___	___	___	___	___	___	___	___	___
__	___	___	___	___	___	___	___	___	___	___
__	___	___	___	___	___	___	___	___	___	___
__	___	___	___	___	___	___	___	___	___	___
__	___	___	___	___	___	___	___	___	___	___
__	___	___	___	___	___	___	___	___	___	___

COLLECTORS (last names)________________________________

COMMENTS:____

____

____

____

____

(Database = DEVELOP)

BIO. FORM NO. 5A

WESTERN SPRUCE BUDWORM
DEVELOPMENT PLOT LOCATION DATA SHEET

INSTALLATION CREW_____ BLOCK NUMBER_____
(last names)

DATE INSTALLED __/__/__ AU NUMBER_____
(mm/dd/yy)

ANALYSIS UNIT NAME_____ PLOT NUMBER_____

SLOPE_____ ASPECT_____ ELEVATION_____ft

TAG & FLAG AT ROADSIDE _____ TOWNSHIP_____S or N

SAMPLE TREE SPECIES _____ RANGE_____E

PERCENT PINE OVERSTORY _____ SECTION_____

PERCENT HOST OVERSTORY _____ 1/4 SECTION_____

ACCESS ROAD(s) TO PLOT _____

PLOT DESCRIPTION _____

DIRECTIONS TO PLOT _____

_____

_____

_____

MAP TO PLOT

BIO. FORM NO. 5B

WESTERN SPRUCE BUDWORM
EVALUATION PLOT LOCATION DATA SHEET

INSTALLATION CREW_____ (last names)

DATE INSTALLED __/__/__ (mm/dd/yy)

ANALYSIS UNIT NAME_____

SLOPE_____ ASPECT_____

TAG & FLAG AT ROADSIDE _____

TAG & FLAG ON PLOT TREES _____

SAMPLE TREE SPECIES _____

PERCENT PINE OVERSTORY _____

PERCENT HOST OVERSTORY _____

BLOCK NUMBER_____

AU NUMBER_____

PLOT NUMBER_____

ELEVATION_____ft

TOWNSHIP_____S or N

RANGE_____E

SECTION_____

1/4 SECTION_____

ACCESS ROAD(s) TO PLOT _____

PLOT DESCRIPTION _____

DIRECTIONS TO PLOT _____

_____

_____

_____

MAP TO PLOT

BIO. FORM NO. 6

** WESTERN SPRUCE BUDWORM PROJECT **

EVALUATION PLOT DATA SHEET

FOREST CODE __ AU NUMBER ___ DATE SAMPLED __/__/__ (mm/dd/yy)

BLOCK NUMBER ___ PLOT NUMBER ___ TREE SPP.(DF,TF) __

TREE NUMBER	BRANCH NUMBER	BUDWORM LARVAE	BUDWORM PUPAE	BUDWORM EXUVIAE	OTHER LARVAE	NO. OF SHOOTS
1	1	___	___	___	___	___
	2	___	___	___	___	___
2	1	___	___	___	___	___
	2	___	___	___	___	___
3	1	___	___	___	___	___
	2	___	___	___	___	___

COLLECTORS (last names)_____

COMMENTS:_____

_____

_____

_____

_____

R6FPM (4/87) (Database = LDENSITY)

BIO. FORM NO. 7

* * * W E S T B U D S * * *

BUDWORM REARING DATA ENTRY SCREEN - 1

FOREST CODE __ AU NUMBER ___ BLOCK NUMBER ___ PLOT NUMBER __

TREE NUMBER	CROWN LEVEL (1,2)	STAGE (1-6)	DATE SAMPLE COLLECTED	DISH NUMBER
__	_	_	__/__/__	____

R6FPM (4/1/88) (Database = **EREAR**)

Crown Level Codes: 1 = Mid-Crown
2 = Lower-Crown

Stage Codes: 1 = L3 4 = L6
2 = L4 5 = Pre Pupa
3 = L5 6 = Pupa

BUDWORM REARING DATA ENTRY SCREEN - 2

FOREST __ AU NUMBER ___

DISH NUMBER	DATE EXAMINED	STATUS (1,2,3,4)
____	__/__/88	_

R6FPM(4/1/88) (Database = **EREAR**)

STATUS CODES: 1 - Dead Larva
2 - Dead Pupa
3 - Moth
4 - Parasite

SPRUCE BUDWORM REARING DATA ENTRY SCREEN - 3

FOREST __ AU NUMBER ___

DISH NUMBER	STAGE CULTURED (1,2,3)	DIAGNOSIS (1,2)
____	_	_

R6FPM(4/1/88) (Database = **EREAR**)

Stage Codes: 1 = Larvae
2 = Pupa
3 = Moth

Diagnosis Codes: 1 = B.t.
2 = Other

BIO. FORM NO. 8

** WESTERN SPRUCE BUDWORM PROJECT **

SPRUCE BUDWORM DEFOLIATION SHEET

FOREST CODE __ AU NUMBER ___ PLOT NUMBER ___ DATE SAMPLED __/__/__
(mm/dd/yy)

TREE NUMBER	BRANCH NUMBER	BUD/SHOOT DEFOLIATION ESTIMATE 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
1	1	_ _ _ _ _ | _ _ _ _ _ | _ _ _ _ _ | _ _ _ _ _
	2	_ _ _ _ _ | _ _ _ _ _ | _ _ _ _ _ | _ _ _ _ _
2	1	_ _ _ _ _ | _ _ _ _ _ | _ _ _ _ _ | _ _ _ _ _
	2	_ _ _ _ _ | _ _ _ _ _ | _ _ _ _ _ | _ _ _ _ _
3	1	_ _ _ _ _ | _ _ _ _ _ | _ _ _ _ _ | _ _ _ _ _
	2	_ _ _ _ _ | _ _ _ _ _ | _ _ _ _ _ | _ _ _ _ _

R6FPM (5/87) (Database = **DEFOLIATE**)

COLLECTORS (last names)_____

COMMENTS:_____

_____

_____

_____

_____

DEFOLIATION INDEX KEY:

1 = 0%	4 = 51-75%	9 = MISSING VALUE
2 = 1-25%	5 = 76-99%	
3 = 26-50%	6 = 100%	

** WESTERN SPRUCE BUDWORM PROJECT **

BUDWORM PHEROMONE TRAPPING DATA ENTRY SHEET

FOREST CODE __ AU NUMBER ___ EXAMINER (last name) _____

BLOCK NUMBER	PLOT NUMBER	DATE TRAPS PLACED	DATE TRAPS COLLECTED	NUMBER OF SBW MOTHS	NUMBER OF OTHER MOTHS
___	___	__/__/__	__/__/__	___	___
___	___	__/__/__	__/__/__	___	___
___	___	__/__/__	__/__/__	___	___
___	___	__/__/__	__/__/__	___	___
___	___	__/__/__	__/__/__	___	___
___	___	__/__/__	__/__/__	___	___
___	___	__/__/__	__/__/__	___	___
___	___	__/__/__	__/__/__	___	___
___	___	__/__/__	__/__/__	___	___
___	___	__/__/__	__/__/__	___	___
___	___	__/__/__	__/__/__	___	___
___	___	__/__/__	__/__/__	___	___
___	___	__/__/__	__/__/__	___	___

R6FPM (5/87) (Database = **MOTHS**)

COMMENTS:_____

****
** PRE-TREATMENT **
****

BIO. FORM NO. 12

** WESTERN SPRUCE BUDWORM PILOT PROJECT **

EVALUATION PLOT DATA SHEET

FOREST CODE __ AU NUMBER ___ DATE SAMPLED __/__/__ (mm/dd/yy)

BLOCK NUMBER ___ PLOT NUMBER ___ TREE SPP.(DF,TF) __

TREE NO.	BRANCH NO.	SBW INSTARS 2nd	3rd	4th	5th	6th	SBW PUPAE	OTHER LARVAE	NO. OF SHOOTS
1	1	___	___	___	___	___	___	___	___
	2	___	___	___	___	___	___	___	___
2	1	___	___	___	___	___	___	___	___
	2	___	___	___	___	___	___	___	___
3	1	___	___	___	___	___	___	___	___
	2	___	___	___	___	___	___	___	___

COLLECTORS (last names) _____

COMMENTS _____

_____

_____

_____

R6FPM (3/88) (Database = **PREDENS**)

FOREST CODE ___ AU NUMBER ___ DATE SAMPLED __/__/__ (MM/DD/YY)

BLOCK NUMBER ___ PLOT NUMBER ___ TREE SP. (DF,TF) ___ CROWN LEVEL (M,L) ___

TREE NO.	2ND	3RD	4TH	5TH	6TH	SBW PUPAE	TOTAL SBW	OTHER LARVAE	NO. OF SHOOTS	

COLLECTORS (last name) _____

AU NO. _____ COLL. DATE ___/___/___
MM/DD/YR

BLOCK NO. _____ PLOT NO. _____

TREE NO. _____ DBH NO. _____

MID-CROWN _____ LOW-CROWN _____

AU NO. _____ COLL. DATE ___/___/___
MM/DD/YR

BLOCK NO. _____ PLOT NO. _____

TREE NO. _____ DBH NO. _____

MID-CROWN _____ LOW-CROWN _____

********** BIO. FORM NO. 13
** POST-TREATMENT **
****

** WESTERN SPRUCE BUDWORM PILOT PROJECT **

EVALUATION PLOT DATA SHEET

FOREST CODE __ AU NUMBER ___ DATE SAMPLED __/__/__ (mm/dd/yy)

BLOCK NUMBER ___ PLOT NUMBER ___ TREE SPP.(DF,TF) __

TREE NUMBER	BRANCH NUMBER	BUDWORM LARVAE	BUDWORM PUPAE	BUDWORM EXUVIAE	OTHER LARVAE	NO. OF SHOOTS
1	1	___	___	___	___	___
	2	___	___	___	___	___
	3	___	___	___	___	___
	4	___	___	___	___	___
2	1	___	___	___	___	___
	2	___	___	___	___	___
	3	___	___	___	___	___
	4	___	___	___	___	___
3	1	___	___	___	___	___
	2	___	___	___	___	___
	3	___	___	___	___	___
	4	___	___	___	___	___

COLLECTORS (last names) _____

COMMENTS_____

R6FPM (3/88) (Database = **POSTDENS**)

BIO. FORM NO. 14

FOLIAGE BIOASSAY DATA SHEET

FOREST CODE __ AU NUMBER ___ DATE ASSAYED __/__/__ (mm/dd/yy)

BLOCK NUMBER ___ PLOT NUMBER ___ TREE SP. = DF OR TF

TREE SP.	BRANCH NO.	TOTAL LARVAE	7-DAY EVALUATION NO. DEAD	7-DAY EVALUATION NO. WITH BT	NAME OF EXAMINER COUNTS	NAME OF EXAMINER DIAGNOSIS
__	____	____	___	____		
__	____	____	___	____		
__	____	____	___	____		
__	____	____	___	____		
__	____	____	___	____		
__	____	____	___	____		
__	____	____	___	____		
__	____	____	___	____		
__	____	____	___	____		
__	____	____	___	____		

COMMENTS:_____

_____

_____

_____

_____

R6FPM (3/88) (Database = **BIOASSAY**)

PETRI DISH NUMBERING LOG

Dish No.	AU No.	Block No.	Plot No.	Tree No.	Date Collected (MM/DD/YY)	Crown Level Middle = M Lower = L

EARLY LARVAL DENSITY SAMPLING

LAB EVALUATION

BLOCK #	PLOT #	DATE		LAB EXAMINER
		FIELD SAMPLE	LAB EVALUATION	

BLOCK NO._____ DATE_____

CREW_____

PLOT NO.	TREE NO.	SPECIE	TIGHT BUD	BUDBURST	ELONGATED	UNFURLED
1	1					
	2					
	3					
	4					
2	1					
	2					
	3					
	4					
3	1					
	2					
	3					
	4					
4	1					
	2					
	3					
	4					
5	1					
	2					
	3					
	4					
6	1					
	2					
	3					
	4					
7	1					
	2					
	3					
	4					

DAILY BIO/LAB ASSIGNMENTS

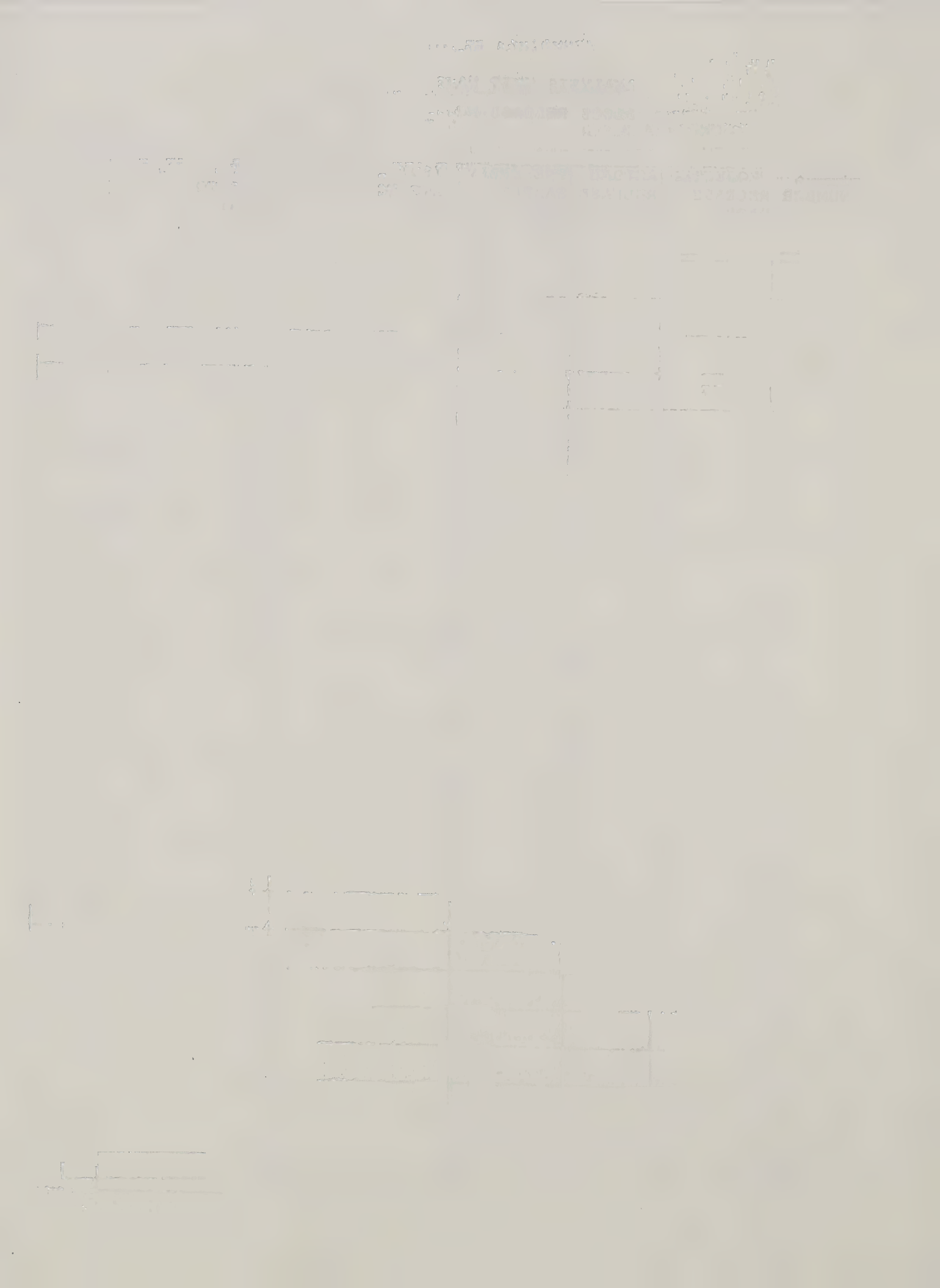
FOR _____

CREW	SUPERVISOR	BLOCK ASSIGNMENTS
		Early Density _____ Development _____ Pre-Treatment _____ Foliage _____ Post-Treatment _____
		Early Density _____ Development _____ Pre-Treatment _____ Foliage _____ Post-Treatment _____
		Early Density _____ Development _____ Pre-Treatment _____ Foliage _____ Post-Treatment _____
		Early Density _____ Development _____ Pre-Treatment _____ Foliage _____ Post-Treatment _____
		Early Density _____ Development _____ Pre-Treatment _____ Foliage _____ Post-Treatment _____

ANALYSIS UNIT NAME ____________________

BLOCK RELEASE NO. ____________________

BLOCK NUMBER	PROJECTED RELEASE DATE	ACTUAL RELEASE DATE	PRE-SPRAY SAMPLE DATE	FIRST AVAILABLE DATE TO SPRAY	LAST AVAILABLE DATE TO SPRAY	ACRES



OFFICE FORMS

CHECK IN SHEET

NAME:_____ SSN:_____ GRADE/STEP:_____

HOME UNIT

REGION:_____ HOME UNIT ADDRESS:_____

FOREST:_____ _____

DISTRICT:_____ _____

PHONE NO.:_____

MOTEL/HOME IN PENDLETON

NAME:_____ PHONE NO:_____

ADDRESS:_____ ROOM NO:_____

_____ DAILY RATE: $_____

VEHICLE PERSONAL-MAKE_____ LICENSE NO._____

GOV'T - MAKE_____ LICENSE NO._____

COST TO GOVERNMENT - YOUR TIME - DAILY: $_____ REGULAR HOURLY: $_____

EMERGENCY NOTIFICATION PERSON:_____

ADDRESS:_____

_____PHONE_____

POSITION ON PROJECT - TITLE_____

SUPERVISOR'S NAME_____

DATE YOU CHECKED IN ON PROJECT:_____

FIRST AID TRAINING - EMT _____

FIRST RESPONDER _____

CURRENT FIRST AID CARD:_____

WEIGHT (WITH FLIGHT EQUIPMENT) FOR AVIATION NEEDS:_____

MILEAGE -- FROM HOME (ONE WAY)_____ FROM MOTEL (ONE WAY)_____

RED CARD AIRCRAFT QUALIFICATIONS_____

_____

MEACHAM PILOT PROJECT PERSONNEL QUESTIONAIRE

Name_____ Date_____ .

1. Do you know how to read a compass? ___Yes ___No

2. Do you know what a Township, Range, and Section are? ___Yes ___No

3. Can you use a map to find your way around on unmarked forest roads? ___Yes ___No

4. Do you own a 4-wheel drive pickup or jeep? ___Yes ___No

5. Prior to this project, have you driven a 4-wheel drive vehicle over steep ground or rough terrain with the front wheel drive transfer case engaged? ___Yes ___No

6. Are you a local resident of one of the following areas? ___Pendleton La Grande ___Meacham ___vicinity ___not from around here.

7. Are you familiar with the Meacham Project area? ___Yes ___No ___Somewhat

8. I have done the following at the Meacham project area: ___Hunted Fished ___Hiked ___Camped ___Picnicked ___None of the above

9. I know how to use a personal computer: ___Well ___Passably ___With limited ability ___Not at all

10. I have a personal computer in my home and know how to use it: ___Yes ___No

11. I have used personal computers: ___At school ___On previous jobs ___I have never used a personal computer

12. Have you had any training or experience in accounting? ___Yes ___No

13. I am fairly good at recordkeeping and simple math: ___Yes ___No

POST-BUDWORM PROJECT EMPLOYMENT QUESTIONAIRE

The Umatilla National Forest may have temporary employment opportunities for individuals interested in working beyond their release from the Meacham Western Spruce Budworm Pilot Project. To help them match individual's experience with job opportunities, please answer the following:

Name_____ Date_____

Grade you were hired for this job at_____

1. If available, I would___ would not___ like to work beyond the time I am released from the Spruce Budworm Project. (If you answered 'would not' skip the remaining questions)

2. How long could you work (latest date) beyond the Spruce Budworm Project?
   _____

3. What fire experience have you had?_____
   _____
   _____
   _____
   _____
   _____
   _____

4. What other forestry experience have you had?_____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____

5. Do you have a valid state driver's license? Yes___ No___
   Which State_____

CREW TIME OFF

Name_____ Date_____

We will soon be developing work schedules and crew assignments and would like to accommodate any special needs for days off that you may have. Please list any specific days that you would like to have off during the next 2 months. Also, please list any particular day or days of the week you would like to have off.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

SPRUCE BUDWORM PROJECT
EMPLOYEE PERFORMANCE RATING
(Read instructions before completing)

Name: _____ SSN No: _____ Date: _____

Date Assigned: _____ Date Released: _____

Employe's Forest and District: _____

Project Assigned to: _____ No of days on project: _____

(If employee worked in more than 1 position, rate the) employees performance in each position).

Position 1: _____

Position 2: _____

Position 3: _____

	If more than one position:		
	1	2	3
1. Performance of critical technical tasks of position			
2. Performance of critical managerial tasks of position			
3. Performance of special assignment			
4. Safety of personnel and care of equipment			
5. Relationships with people outside project team			
6. Endurance, physical and mental			
7. Effective use of resources			
OVERALL RATING			

RATING CODE

1 = EXCELLENT
2 = MEETS REQUIREMENTS
3 = NEEDS IMPROVEMENT
N/A = NOT APPLICABLE

COMMENTS: (Include any information about special problems encountered, degree of difficulty of assignment, plus any training recommended for this employee).

Rabers signature _____ Date _____

Employees signature _____ Date _____

(REQUIRED)

SPRUCE BUDWORM PROJECT

EMPLOYEE PERFORMANCE RATING
(Read Instructions before Completing)

NAME: SOCIAL SECURITY NO.: EMPLOYEE NO.:

EMPLOYE'S DISTRICT:

DATE ASSIGNED:

DATE RELEASED:

DATE OF RATING:

RATING CODE

1 = Excellant
2 = Meets Requirements
3 = Needs Improvement
N/A = Not Applicable

POSITION	Number of Days	Performance of critical technical tasks of position.	Performance of critical managerial tasks of position.	Performance of Special assignments.	Safety of personnel and care of equipment.	Relationships with people outside project team.	Endurance, physical and mental.	Effective use of resources.	OVERALL RATING	RATER	PROJECT DIRECTOR

COMMENTS: (Include any information about special problems encountered, degree of difficulty of assignment, plus any training recommended for this employe.)

EMPLOYEE SIGNATURE: Employee's signature Required

CHECK OUT

NAME: _____

DESTINATION

CITY: _____

FOREST: _____

RANGER DIST: _____

RELEASE DATE: _____

ETD: _____

ETA: _____

MODE OF TRAVEL: _____
(POV,GOV,AIR,ECT.)

VEHICLE NO: _____
(GOV.)

EQUIPMENT TURNED IN: _____

VEHICLE TURNED IN: _____

BRING TO TIMEKEEPER COMPLETED T&A FOR PROJECT TIME!

YOU WILL BE GIVEN A COPY OF YOUR LAST T&A AND A COPY OF YOUR LAST TRAVEL VOUCHER TO TAKE BACK TO YOUR HOME UNIT!

SUPREVISOR: _____

MEACHAM SPRUCE BUDWORM SPRAY PROJECT
1988

Employee's name: _____

Termination date: _____

Check list for people resigning

1)	Have employee fill in blocks A, B, C, D & E on back of SF52	_____ _____
2)	Sign final time sheet, fill in block on lower right hand corner with 'FINAL TIME'	_____ _____
3)	Performance Evaluation	_____ _____
4)	Project Critique	_____ _____
5)	Turn in Equipment	_____ _____
6)	Turn in Government Driver's License	_____ _____
7)	Give Employee Copy of Final Time Sheet and Performance Evaluation	_____ _____

Check list for people being terminated for lack of work

1)	Entomology Section Chief and IC sign SF52	_____ _____
2)	Sign final time sheet, fill in block on lower right hand corner with 'FINAL TIME'	_____ _____
3)	Performance Evaluation	_____ _____
4)	Project Critique	_____ _____
5)	Turn in Equipment	_____ _____
6)	Turn in Government Driver's License	_____ _____
7)	Give Employee Copy of Final Time Sheet and Performance Evaluation	_____ _____

Check list for people transfering duty station

1)	Contact Districts Picking Employee Up. Inform them that they need to notify Personnel - Do Not Issue SF52	_____ _____
2)	Sign final time sheet	_____ _____
3)	Performance evaluation	_____ _____
4)	Project Critique	_____ _____
5)	Turn in Equipment	_____ _____
6)	Turn in Government Driver's License	_____ _____
7)	Give Employee Copy of Final Time Sheet and Performance Evaluation	_____ _____

SEND SF52 TO GLENYTH MINOR, PERSONNEL, WALLOWA-WHITMAN NF, 1550 DEWEY AVE, PO BOX 907, BAKER, OR 97814.

SEND FINAL TIME SHEET, LEAVE AUDIT AND LUMP SUM LEAVE FORM TO PAYROLL, WALLOWA-WHITMAN NF, 1550 DEWEY AVE, PO BOX 907, BAKER, OR 97814.

SEND EMPLOYEE'S FOLDER TO UMATILLA SUPERVISOR'S OFFICE.

Meacham Spruce Budworm
Routing Slip

Incident Commander_____
Deputy IC_____
Administration_________
Plans_______
Ops_________
Ent_________

Meacham Spruce Budworm
Routing Slip

Incident Commander_____
Deputy IC_______
Administration_________
Plans________
Ops__________
Ent__________

Meacham Spruce Budworm
Routing Slip

Incident Commander_____
Deputy IC______
Administration_________
Plans_______
Ops_________
Ent_________

Meacham Spruce Budworm
Routing Slip

Incident Commander______
Deputy IC________
Administration__________
Plans_______
Ops_________
Ent_________

Meacham Spruce Budworm
Routing Slip

Incident Commander______
Deputy IC_______
Administration__________
Plans________
Ops__________
Ent__________

Meacham Spruce Budworm
Routing Slip

Incident Commander_______
Deputy IC________
Administration___________
Plans______
Ops________
Ent________

MEACHAM SPRUCE BUDWORM SPRAY PROJECT
1988

EMPLOYEE CRITIQUE

Please respond to the following items by circling the words which most closely describe your opinions.

I. Training

1) How important were the following training experiences in preparing you for the job?

a) Defensive Driving	Very Important	Moderately Important	Not Very Important
b) Multi-media First Aid Training	Very Important	Moderately Important	Not Very Important
c) Budworm Sampling Procedures	Very Important	Moderately Important	Not Very Important
d) One-on-One Individualized Training	Very Important	Moderately Important	Not Very Important
e) Map Reading	Very Important	Moderately Important	Not Very Important

COMMENTS: (Suggestions and criticisms)

2) How would you rate the quality of the instruction during the following training experiences?

a) Defensive Driving	Poor	Fair	Good	Excellent
b) Multi-media First Aid Training	Poor	Fair	Good	Excellent
c) Budworm Sampling Procedures	Poor	Fair	Good	Excellent
d) One-on-one Individualized Training	Poor	Fair	Good	Excellent
e) Map Reading	Poor	Fair	Good	Excellent

COMMENTS: (Suggestions and criticisms)

I. Training (Cont.)

3) The following items should have been addressed in your new employee orientation. Indicate if this training adequately addressed these items.

a) 1st 40 Tour of Duty	Not Adequate	Adequate	More Than Adequate
b) Use of Sick Leave, Annual Leave, and Leave Without Pay	Not Adequate	Adequate	More Than Adequate
c) Day (Regular, Overtime, Premium Pay Periods)	Not Adequate	Adequate	More Than Adequate
d) Ethics and Conduct	Not Adequate	Adequate	More Than Adequate

COMMENTS: (Suggestions and criticisms)

4) This is the first year that the crews have been asked to determine larval instars in the field. How would you rate your ability to discriminate 2nd, 3rd, and 4th instars?

Not Very Successful Moderately Successful Highly Successful

How would you rate your ability to discriminate 5th and 6th instars?

Not Very Successful Moderately Successful Highly Successful

Would additional training or training aids help improve your instar determinations?

No Probably Definitely

Comments: (Suggestions and criticisms)

5) How would you rate your ability to classify unfurled foliage?

Not Very Successful Moderately Successful Highly Successful

Would additional training or training aids help improve your determination of unfurled foliage?

No Probably Definitely

I. Training (Cont.)

If you are a Husky Hunter operator, please answer the following questions.

6) How well did the instructions and practice sessions prepare you for using the Husky Hunter as a field data recorder?

Not Well Moderately Well Very Well

7) Did you feel that the 'form04.hba' program used to enter development data was an efficient and effective means of data entry?

No Moderately Efficient Very Efficient

8) If you could modify the 'form04.hba' program what changes would you make to improve the usefullness and efficiency of the Husky Hunter for field data entry?

Comments: (Suggestions and criticisms)

II. Assigned Jobs

1) Were the daily assignments clear? Not Clear Usually Clear Always Clear

2) On an average how long did it take you to complete the assigned work load?

Less Than 8 Hrs. About 8 Hrs. More Than 8 Hrs.

3) Were you adequately prepared to accomplish the assigned work? No Usually Always

Comments : (Suggestions and criticisms)

III. Supervision

1) How would you rate the supervision you received?

Too Loose Adequate Too Tight

III. Supervision (Cont.)

2) Were the supervisors available to help you during your field work?

Infrequently Usually Always

3) Were the supervisors available to help you during your lab work?

Infrequently Usually Always

4) Were the supervisors reasonably consistant with their instructions and advice?

No Usually Always

5) Were the morning briefings useful in disseminating information, providing instructions, clarifying work assignments, etc.?

No Usually Always

6) Were the safety messages and briefings beneficial to you in identifying work hazards and in passing along safety tips?

No Usually Always

7) What would you change or do differently if you were the entomology supervisor?

Comments: (Suggestions and criticisms)

IV. Equipment and Facilities

1) What type of vehicle was assigned to you or your original partner at the beginning of the project?

2-wheel Drive 4-wheel Drive

2) In your opinion how important was it to have the use of a 4-wheel drive rather than a 2-wheel drive vehicle?

Not Very Important Moderately Important Extremely Important

3) In your opinion, would a small-sized pickup truck have worked better than a full-sized truck, given the road conditions on the project?

Better Worse No Difference I Don't Know

IV. Equipment and Facilities (Cont.)

4) How many times did you get stuck requiring either digging the vehicle out or towing the vehicle out?

0 1 2 3 or more

5) At the beginning of the project were you licensed as a designated or alternate 4-wheel driver?

Designated Driver Alternate Driver

6) How many times on an average did you drive per week?

0 1 2 3 4 5 or more

Comments: (Suggestions and criticisms)

7) From a safety stand point, did you feel that the radio system was functioning sufficiently well for you to obtain help if needed?

Not Adequate Usually Adequate Always Adequate

8) From an operational stand point, how would you rate the quality of the radio transmission between:

a) you and crews within the same block (channel 1) Not Adequate Usually Adequate Always Adequate

b) you and crews in different blocks (channel 1) Not Adequate Usually Adequate Always Adequate

c) you and Meacham Base (channel 2) Not Adequate Usually Adequate Always Adequate

9) What could we have done differently to improve the radio communications between crews or between crew and Meacham Base?

Comments: (Suggestions and criticisms)

IV. Equipment and Facilities (Cont.)

10) How would you rate the laboratory equipment, work tables, chairs, magnifier ring lamps, etc.?

Poor Fair Good Excellent

Comments: (Suggestions and criticisms)

11) Numerous forms were used throughout the project, how would you rate the use of these forms? (circle one)

a. Too complex, unclear, and confusing

b. Forms were usable, but could have been a little clearer or less complex.

c. Forms were easy to use and reasonably clear.

d. Forms were very clear, understandable and easy to use.

Comments: (Suggestions and criticisms)

12) The following items of equipment were issued to you during this project. Were these items satisfactory?

a)	beating cloth and stick	Satisfactory	Unsatisfactory
b)	pole pruners	Satisfactory	Unsatisfactory
c)	hand clippers	Satisfactory	Unsatisfactory
d)	crew kits	Satisfactory	Unsatisfactory
e)	shovel	Satisfactory	Unsatisfactory
f)	Polaski	Satisfactory	Unsatisfactory
g)	first aid kit	Satisfactory	Unsatisfactory
h)	fire extinguisher	Satisfactory	Unsatisfactory
i)	hard hats	Satisfactory	Unsatisfactory
j)	canteens	Satisfactory	Unsatisfactory
k)	individual expendable items (i.e. water bottles, bug repellent, etc.)	Satisfactory	Unsatisfactory

IV. Equipment and Facilities (Cont.)

13) What additional equipment would have been useful?

Comments: (Suggestions and criticisms)

14) Which maps did you use most frequently to locate plots?

2":mile map of entire area Page size block maps

15) How useful were the plot location data sheets?

Not Useful Moderately Useful Extremely Useful

16) Several discrepancies were reported between actual plot locations and the maps. How could we improve the plot establishment and mapping procedures to eliminate these discrepancies?

17) How would you rate the Project Headquarters as a meeting place and work laboratory?

Poor Fair Good Excellent

V. Interaction with Other Project Individuals or Teams

1) How would you rate the support you or the entomology group received from:

a) Logistics and Finance (Jim Conn)	Excellent	Good	Fair	Poor	I Don't Know
b) Supply/Fleet (Jerry McKinney)	Excellent	Good	Fair	Poor	I Don't Know
c) Time Clerk (Martiese and Penny)	Excellent	Good	Fair	Poor	I Don't Know
d) Safety (Rich Thurman)	Excellent	Good	Fair	Poor	I Don't Know

Comments: (Suggestions and criticisms)

V. Interaction with Other Project Individuals or Teams (Cont.)

2) How would you rate your interactions with the following project individuals or teams:

a)	Incident Commander (Larry Stice)	Excellent	Good	Fair	Poor	I Don't Know
b)	Deputy IC (Randy Dohrmann)	Excellent	Good	Fair	Poor	I Don't Know
c)	Plans (Dean Bishop)	Excellent	Good	Fair	Poor	I Don't Know
d)	Operations (Gordon Orloff)	Excellent	Good	Fair	Poor	I Don't Know
e)	Public Information (Alexis Jackson)	Excellent	Good	Fair	Poor	I Don't Know
f)	Dispatch (Barry Griffith)	Excellent	Good	Fair	Poor	I Don't Know
g)	Pathlink Coordinator (Tim McConnell)	Excellent	Good	Fair	Poor	I Don't Know
h)	Spray Assessment Crew (Canadians)	Excellent	Good	Fair	Poor	I Don't Know

Comments: (Suggestions and criticisms)

VI. General Information

1) What is your most memorable happening from the 1988 Meacham Budworm Spray Project?

2) Would you apply for a job on a future spray project?

In A Minute Absolutely Not Maybe If I Get A Raise

3) What was particularly good about your work on the project?

VI. General Information (Cont.)

4) What did you not like about your work on the project?

SAFETY FORMS

VEHICLE SAFETY CHECK LIST

Name of Inspector	Vehicle ID No.	Speedometer Reading	Date

1. Last Lube.....Speedometer reading_____
2. Last Oil Change.....Speedometer reading_____
3. First Aid Kit clean, serviceable.....
4. MIRRORS SERVICEABLE AND TIGHT IN BRACKETS.....
5. GLASS CLEAR AND WINDOW OPERATIONAL.....
6. WINDSHIELD WIPERS, WASHERS, DEFORSTER OPERATIONAL.....
7. DRIVER'S FLOOR CLEAR, TOOL BOXES ANCHORED.....
8. LIGHTS, HORN, DASH WARNING LIGHTS OPERATIONAL.....
9. BACK-UP ALARM (if applicable).....
10. Hood latch and safety catch working properly.....
11. Radiator cap, core and hoses serviceable.....
12. Battery snug, clean and with adequate fluid.....
13. Oil-Engine clean and at operating level.....
14. Oil-Auto-Transmission and power steering.....
15. All drive belts tight and serviceable.....
16. STEERING SYSTEM OPERATIONAL.....
17. Springs and shock abosorbers in good condition.....
18. Leaks - exhaust, brakes, fuel lines, cooling.....
19. TIRES PROPERLY INFLATED AND IN GOOD CONDITION.....
20. Doors,fenders,bumpers,body,and trailer ball TIGHT-SERVICE.
21. Access mounted and operable-spare tire,jack,tire chains...
22. BRAKES (FOOT AND PARKING) EFFECTIVE.....
23. SPEEDOMETER AND ODOMETER OPERATING PROPERLY.....
24. Clutch operational.....
25. Seats, cushions, SEAT BELTS, TRACK OPERATIONAL.....
26. VEHICLE HANDLING ACCEPTABLE.....

REMARKS:

UNSATISFACTORY ITEMS CORRECTED:

BY_____ DATE_____

Injuries
Field Crews
(Entomology and Operations)

1. Keep Calm!

2. Determine severity of injury

A. Minor injury with only first aid required

/__/ 1. Administer first aid

/__/ 2. Contact your supervisor

/__/ 3. Fill out CA1 or proper agency forms (get from finance) within 48 hours.

B. Minor injury that requires further medical attention. (ie stiches for a laceration)

/__/ 1. Contact your supervisor and/or Meacham Base to arrange to take the injured party to a medical facility.

/__/ 2. Fill out CA1 or proper agancy forms (get from finance)

C. Major injury requiring ambulance service or medevac

1. Contact Meacham Base - Give them:

/__/ A. Nature of injury (ie possible spinal injury the victim has not feeling fromt he waist down)

/__/ B. Exact location - (ie in block 6, T15 R35E Sec 9 NE NE Near Meacham Lake)

/__/ C. Government employee or private citizen

/__/ D. Tell dispatch you are requesting an ambulance

/__/ E. Fill out CA1 or proper agency forms (get from finance)

/__/ F. Notify your supervisor ASAP

3. Other crews in the area will restrict communications and go about normal business unless specifically requested.

Handling Accidents and Injures
Vehicle Accident
Field Crews
(Entomology and Operations)

1. Keep Calm!

2. Contact supervisor and/or Meacham Base (dispatch) - Inform them of:

/__/ A. Location - townships, range, section, road #, and general location. IE T15 R35E Section 9 NE NE, Near Meacham Lake in Block 6

/__/ B. If medical assistance is needed- how many people need assistance and nature of injures. IE Medical assistance is needed for one person with a possible fractured leg. Do Not Move

/__/ C. Extent of vehicle damage - IE Minor damage to rear bumper of GOV vehicle.
Minor damage - Less than $350.00
Major damage - Over $350.00 or private citizen involved

/__/ D. If another vehicle is involved and whether or not a private citizen is involved.

3. Render first aid if needed

4. The driver needs to collect the following:

/__/ A. Take pictures if possible

/__/ B. Get witness statements

/__/ C. Fill out accident forms in vehicle

/__/ D. Sketch accident scene if camera is not available

/__/ E. Try not to move vehciles if accident is classed as a major accident (greater than $350.00 or private citizen is involved) Go ahead and move vehicles if it is to dangerous to leave them in road way.

/__/ F. If private citizen is involved - get driver's license #, vehicle license #, registration #, driver's date of birth, written statement from driver as to what happened.

/__/ 5. Wait for your supervisr or the investigator to show up before proceeding with normal business.

/__/ 6. All other crews restrict radio communications and go about normal business unless specifically requested to help

INJURIES
SUPERVISOR'S RESPONSIBILITIES
(Entomology and Operations)

1. Keep Calm!

2. Determine severity of injury.

A) Minor injury requiring first aid

/__/ 1. Make sure CA1 or appropriate agency form is filled out.

/__/ 2. File CA1 through finance and a copy to Safety (Rich Thurman).
DO THIS WITHIN 48 HOURS

B) Minor injury requiring further medical attention. (ie. stitches for laceration)

1. If possible have injured party brought into headquarters to have the necessary paperwork completed.

/__/ 2. If the injured party needs to go the medical facility make sure someone meets them at the facility with the appropriate paperwork.

/__/ 3. Report the incident to the Safety officer (Rich Thurman).

C) Major injury requiring ambulance or medevac.

/__/ 1. Find out exact location (township, range, sect. block, road etc)

/__/ 2. Will have to arrange to have someone guide ambulance into scence. May have to trnsport ambulance personnel into scene.

/__/ 3. Determine injuries then if Medevac is needed order specifically through dispatch.

Determing when medevac should be used:
a. Accessability or weather may determine what is needed (ie 4 wheel drive road with 4X4 mud holes or poor flying weather)

/__/ 4. Make sure someone will meet the injured party at the medical facility with the proper paperwork.

/__/ 5. Notify Incident Commander, Safety Officer and Section Chief.

Handling Accidents and Injuries
Vehicle Accidents
Supervisors Responsibilities
(Entomology and Operations)

1. Keep Calm!

2. Supervisor needs to gather the following information:

/__/ A. Exact location of the accident (ie township, range block ect)

/__/ B. Medical assistance needed or not
1. If YES -- type of injuries and the number of victims needing attention.

/__/ a. If an ambulance is needed the supervisor will need to make arrangements for someone to guide the ambulance into the accident.

/__/ b. Make the determination as to whether to request the Medevac helicopter or ambulance.
1. Accessability or weather may determine what is needed (ie 4-wheel drive roads with mud holes)
2. If Medevac helicopter is used a person (probably operations type) will have to use ground-to-air signals to direct the helicopter in

/__/ C. Determine the extent of damage

1. Minor accident Less $350.00 - start vehicle investigation by notifying Incident Commander, Safety Officer (Rich Thurman) and Section Chief. Take pictures, sketch scene, get witness statements and have the friver fill out accident forms.

2. Major Accidnet Greater $350.00 and/or a private citizen is involved and/or a possible claim against the government.

/__/ a. Notify - Dispatch, Safety Officer (Rich Thurman) and Section Chief, Incident Commander

/__/ b. Determine f tow truck is needed if so arrange through Dispatch Should arrive after the investigations if complete

/__/ c. Start accident investigation by make sure the following have taken place:

/__/ 1. Secure scene - try not to move vehicles unless they are causing a safety concern, take picutres if possible, draw sketch

/__/ 2. Get Witness statements

/__/ 3. If another vehicle is involved get the driver's statement, insurance number, dirver's license #, vehcile license # & state, registration #, vehicle description

/__/ 4. Have driver fill out accident forms (in vehicle) Make sure driver fills out state accident form if appropriate.

/__/ D. Check with dispatch to make sure an accident investigator is on the way.

/__/ E. Go to scene if at all possible.

MINUTES OF CREW MEETING

Date _____

Company _____

Crew Name _____

Number Present _____

Old Business Discussed _____

_____

_____

Subjects of This Meeting _____

_____

_____

_____

_____

_____

_____

Suggestions Made _____

_____

_____

_____

_____

_____

_____

Foreman _____

TAILGATE SAFETY MEETING

Instructions
To be completed by first line supervisor or work leader at the worksite prior to beginning the job and when the hazards change due to a change in worksite location or other conditions. Add any hazards that do not appear on the 6700-7. Reference Health and Safety Code Handbook (FSH 6709.11) to help identify recommended work procedures and protective equipment.

Study/Project/Job_____ **Work Leader/Supervisor**_____

Describe Work:_____

_____

_____

IDENTIFY & LIST HAZARDS **DISCUSS HAZARD REDUCING WORK PROCEDURES**

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

NAMES OF PEOPLE ATTENDING

_____

_____

Protective Equipment Required by the Job Hazard Analysis

_____

_____

Additional Protective Equipment Needed:_____

_____

Date Tailgate Safety Meeting was held_____

_____

Turn this form into the Incident Commander or the Safety Officer.

Signature of Work Supervisor_____

Date _____

IC_____

SO_____

STAFF_____

DAILY SIGN-OUT SHEET

DATE_____

NAME Please Print	UNIT	VEH. NO	GENERAL LOACATION Rd.no/ leagal location	TIME OUT	TIME IN

SEARCH & RESCUE INFORMATION REPORT

1. Informant Name: _____ Date _____ Time _____

2. Sheriff's Case # _____ Taken By _____

3. Name and Address of person reporting incident _____

_____

4. Can person who reported accident be reached by phone? _____ Phone No. _____

5. Can an ambulance get the rescue party back to the site, if not, who can? _____

6. Number of persons injured or lost _____

7. Type of injuries _____

8. Location of accident & landmarks _____

9. Time of accident _____ Date _____

10. Names and ages of person injured _____

11. Names and addresses of other persons in party not injured _____

_____

12. Was injured person dressed warmly? _____
Is injured person in sheltered place? _____

13. Given name of party _____

14. Equipment of party for the rescue or use _____

15. Cause of injury (1) Fall, Drown, Lightning, Snow, Slide, Ice, or _____ Air _____
(2) Lava, River, Salt Water _____ Death _____ Fire or Slow current _____

16. Weather at site _____

17. Time traveled - How long did it take for the rescuers to come out _____

18. Is any of the party contact cell? _____ Search _____ Signal by _____

Landing sites _____

19. Best route or approach _____

20. Are any other areas endangered? _____

21. What has been done or is being done _____

22. Available help of local men _____ Equipment _____

Other aids _____

23. Are maps and photographs on area available? _____

24. Additional Comments _____

25. Chief notified - Time _____ Date _____

26. Deputy notified - Time _____ Date _____

SPILL LOG

1. Who reported the spill?_____

   Name_____

   Adress_____

   Phone No._____

2. Location of Spill_____

3. Source of Spill_____

4. Material Spilled_____

5. Date and Time of Spill_____

6. Spill Quantity_____

7. Area or Waterbody Endangered_____

8. Person at the Scene_____

9. Actions Initiated_____

10. Shipper/Manufacturer_____

11. Container Type_____

12. Truck I.D. No._____

13. Placard/Lable Info._____

Relayed to:		Date	Time
_____	(District Spill Coord.)	_____	at_____
_____	(Forest Spill Coord.)	_____	at_____
_____	(Regional Spill Coord.)	_____	at_____
_____	(OARS-EMD or DEM Rep.)	_____	at_____

* Log Events on Reverse Side.

EXHIBIT 3

WESTERN SPRUCE BUDWORM SPRAY PROJECT

SPILL AND/OR ACCIDENT REPORT

DATE____/____/____ Investigator_____

1. Type of Incident: Personal Injury:_____

Ground Spill_____ Aircraft Crash_____

Off-target Spraying_____ Vehicle Accident_____

Other:_____

2. Date of Incident:____/____/____ Time:____AM____PM

Agency Involved: State_____Federal_____Contractor_____

3. Aircraft Identification: Vehicle Identification:

Type_____ Type_____

Owner_____ Owner_____

Color_____ Number_____

Number_____ Driver_____

Pilot_____ Address_____

Address_____ Phone_____

Phone_____

4. Incident Location:

County_____ Spray Block_____

Legal Discription, T____,R____,SEC____,SUB SEC _____

Area Description:_____

_____

5. Insecticide:

Product Name_____

Amount Spilled (gallons)_____

How was Insecticide Handled?_____

6. Description of Incident and Probable Cause:

_____

_____

_____

7. Personal Injuries:

Name of Injured	Received Medical Treatment	Hospitalized	No Treatment
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Hospital: Name_____
Address_____
Phone_____

Physician Name_____
Adress_____
Phone_____

8. Other Damage:

Environmental_____Building_____Vehicle_____
Other_____
Description of Damages:_____
_____
_____
_____

9. Comments:

_____

_____

_____

_____

_____

_____

_____

10. Date of Follow-up Investigation_____

Investigator_____

UNITED STATES DEPARTMENT OF AGRICULTURE

APPLICATION FOR MOTOR VEHICLE OPERATOR'S IDENTIFICATION CARD

SECTION 1.—To Be Completed by Applicant

INSTRUCTIONS: This form must be completed before applicant may be issued or reissued a U.S. Government Motor Vehicle Identification Card, SF-46. See Department Personnel Manual Chapter 930, Subchapter 1. Any block may be continued on reverse after identifying block number. If application is prepared for renewal or replacement of the SF-46, list past 3 years in lieu of 5 years when completing Blocks 13, 14, 15, and 16.

1. Name	2. Social Security No.	3. Current Valid State Driver's License No.	4. Issuing State of Current Valid Driver's License	5. Sex Male Female

6. Height (inches)	8. Eyes (color)	10. Date of Birth (mo.-day-yr.)	11. Date State Driver's License Expires	12. List Restrictions Shown on State Driver's License
7. Weight (pounds)	9. Hair (color)			

13. No. Years of Driving Experience	14. Types of Vehicles Operated; Years Experience for Each	15. Within the Past 5 Years, List States Issuing Previous Driver's Licenses (abbreviate)

16. Within the Past 5 Years, List all Summonses or Arrests for Moving Violation of Motor Vehicles Laws or Ordinances (by date, place, and charge)	List all convictions (case by case indicating dates) or Other Disposition

17. List of Accidents in Past 5 Years (by date, place, circumstances and dollar damage to vehicle, driver, other vehicles, and property)

18. List All Suspensions or Revocations of State Driver's License within the Past 5 Years, or of the SF-46 within the Past 3 Years

I certify that all the information given by me in Section I of this application is true, complete, and made in good faith.	Signature of Applicant	Date of Application
I have reviewed the employee's driving ability, and to my knowledge, this employee is capable of safely operating a motor vehicle.	Signature of Applicant's Supervisor	Date

SECTION 2.—To Be Completed by Issuing Official

19. (Check one)	20. (Check one)	21. Employment Status (Check one)	22. Visual Acuity (Check one)
[ ] Original SF – 46	[ ] Operator	[ ] Formal Appointment	[ ] Acceptable
[ ] Renewal of SF – 46	[ ] Incidental Operator	[ ] Letter of Authorization	[ ] Not Acceptable
[ ] Replacement SF – 46	[ ] Other	[ ] Non-Federal Cooperative	

23.	Yes	No		Yes	No	25. Road Test	Yes	No
Meets SF – 47 Requirements			24. Applicant Passed: Road Test			Waived (If waived explain on reverse)		
Meets SF – 78 Requirements								

26. Date of Road Test	27. Name of Examiner	28. Results from Search of National Driver Register. (If negative, attach explanation. NOTE: The search is mandatory)	☐ Positive ☐ Negative

I have reviewed the contents of the completed form and other information. The applicant is herewith issued a Standard Form 46, "Motor Vehicle Operator's Identification Card". Any restrictions are described on the reverse of the SF – 46.

29. Signature of Certifying Officer	30. Title	31. Date

32. List class(es) of vehicle(s) applicant is authorized to operate

Standard Form 47
(Rev. 1-77)
U.S. Civil Service Commission
FPM Chapter 930

PHYSICAL FITNESS INQUIRY FOR MOTOR VEHICLE OPERATORS

47-105

1. Last Name—First Name—Middle Name	2. Date of Birth	3. Title of Position

4. Home Address (*Number, street or RFD, city or town, State and ZIP code*)	5. Employing Agency

6. Have you ever had or have you now (*Place check at left of each item*):

YES	NO		YES	NO	
		Poor vision in one or both eyes			Arthritis, rheumatism, swollen or painful joints
		Eye disease			Loss of hand, arm, foot, or leg
		Poor hearing in one or both ears			Deformity of hand, arm, foot, or leg
		Diabetes			Nervous or mental trouble of any kind
		Palpitation, chest pain, or shortness of breath			Blackouts or epilepsy
		Dizziness or fainting spells			Sugar or albumin in urine
		Frequent or severe headaches			Excessive drinking habit (Alcohol)
		High or low blood pressure			Other serious defects or diseases
		Drug or narcotic habit			

7. If your answer is "Yes" to one or more of the above questions, explain fully in this space, indicating date of original condition and current status:

8. (A) Do you wear glasses (or contact lenses) while driving? ☐ YES ☐ NO

(B) Do you wear a hearing aid? ☐ YES ☐ NO

PRIVACY ACT NOTICE

Authority: This information is provided pursuant to Public Law 93-579 (Privacy Act of 1974), December 31, 1974, for individuals completing Standard Form 47, Physical Fitness Inquiry for Motor Vehicle Operators. U.S. Code, Title 5, section 301.

Purposes and Uses: SF 47 is used to ascertain the physical fitness of Federal employees, whose jobs are not regular motor vehicle operating jobs, to drive Government-owned motor vehicles. It is also used in the renewal of authorizations for all employees. Based on the information provided, employees may be referred for a medical examination before being given a renewal.

Effects of Nondisclosure: Nondisclosure of this information will result in the employee not being authorized to drive a Federal motor vehicle. The disclosure of this information is mandatory when an employee's job requires driving a Federal motor vehicle and is voluntary otherwise.

I certify that my answers above are full and true, and I understand that a willfully false statement or dishonest answer to any question may be grounds for cancellation of my eligibility or my dismissal from the service and is punishable by law.

Signature	Date

REVIEW AND CERTIFICATION BY DESIGNATED OFFICIAL

I certify that I have reviewed this physical fitness inquiry form and other available information regarding the physical condition of the applicant, and that I have made the following determination:

☐ There is no information on this form or otherwise available to indicate that the applicant should be referred for physical examination.

☐ On the basis of items checked on this form or other information, this applicant must be referred for physical examination before he is authorized to operate a Government-owned motor vehicle or his current authorization is renewed.

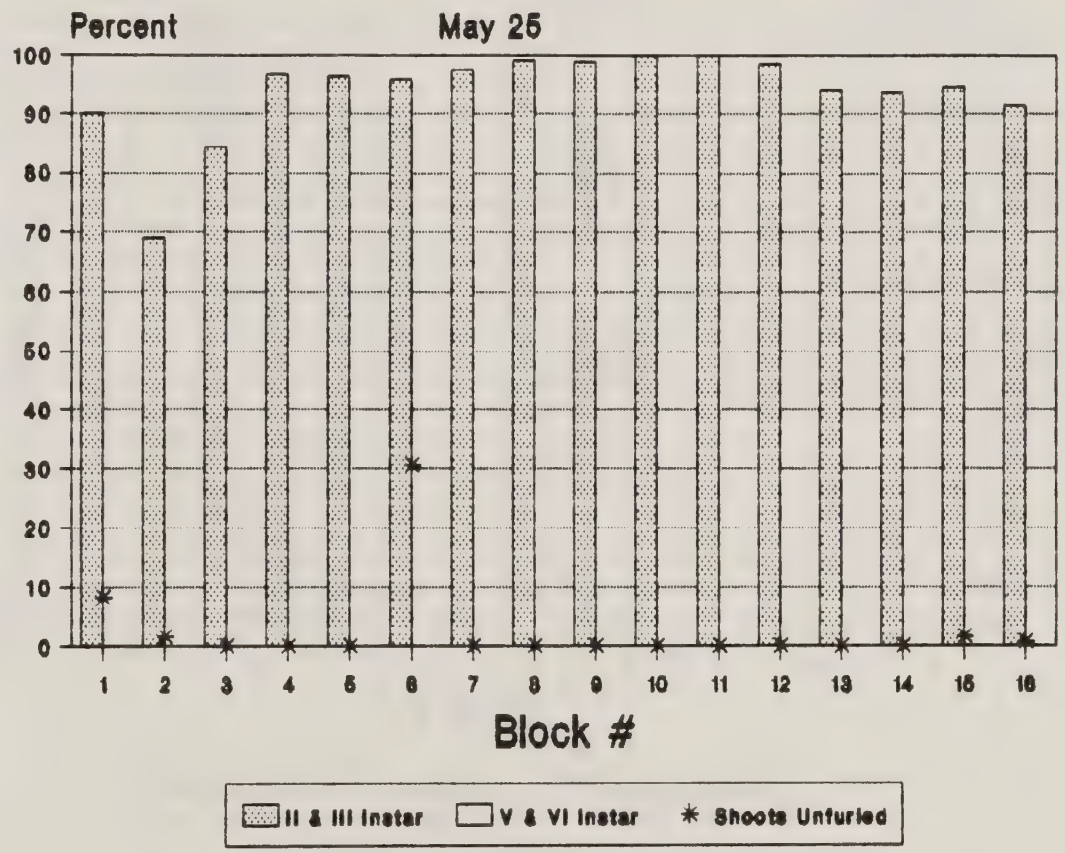
☐ Items checked on this form or otherwise available do not warrant referral for medical examination because of the following facts:

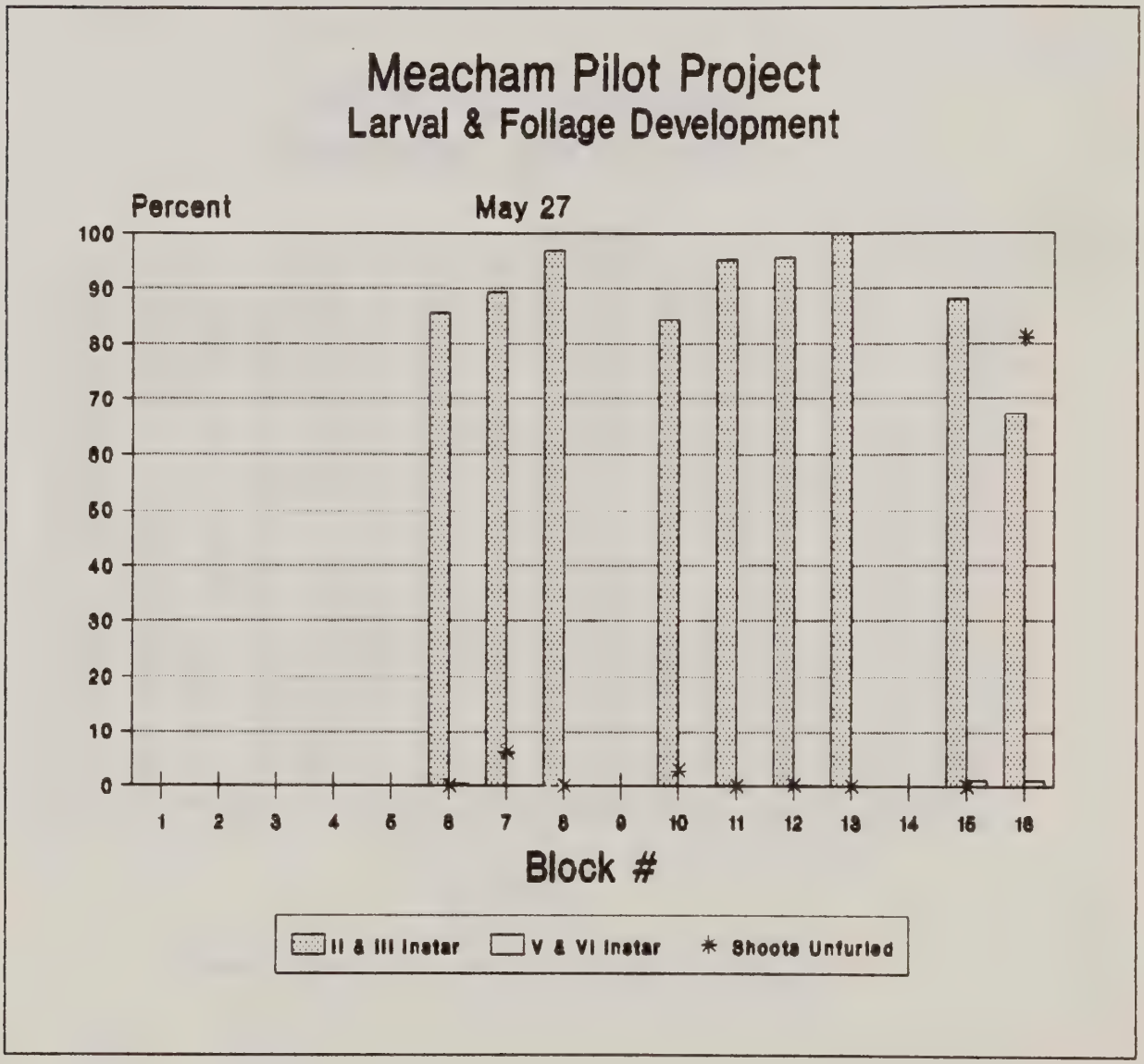
Signature of Designated Official	Date

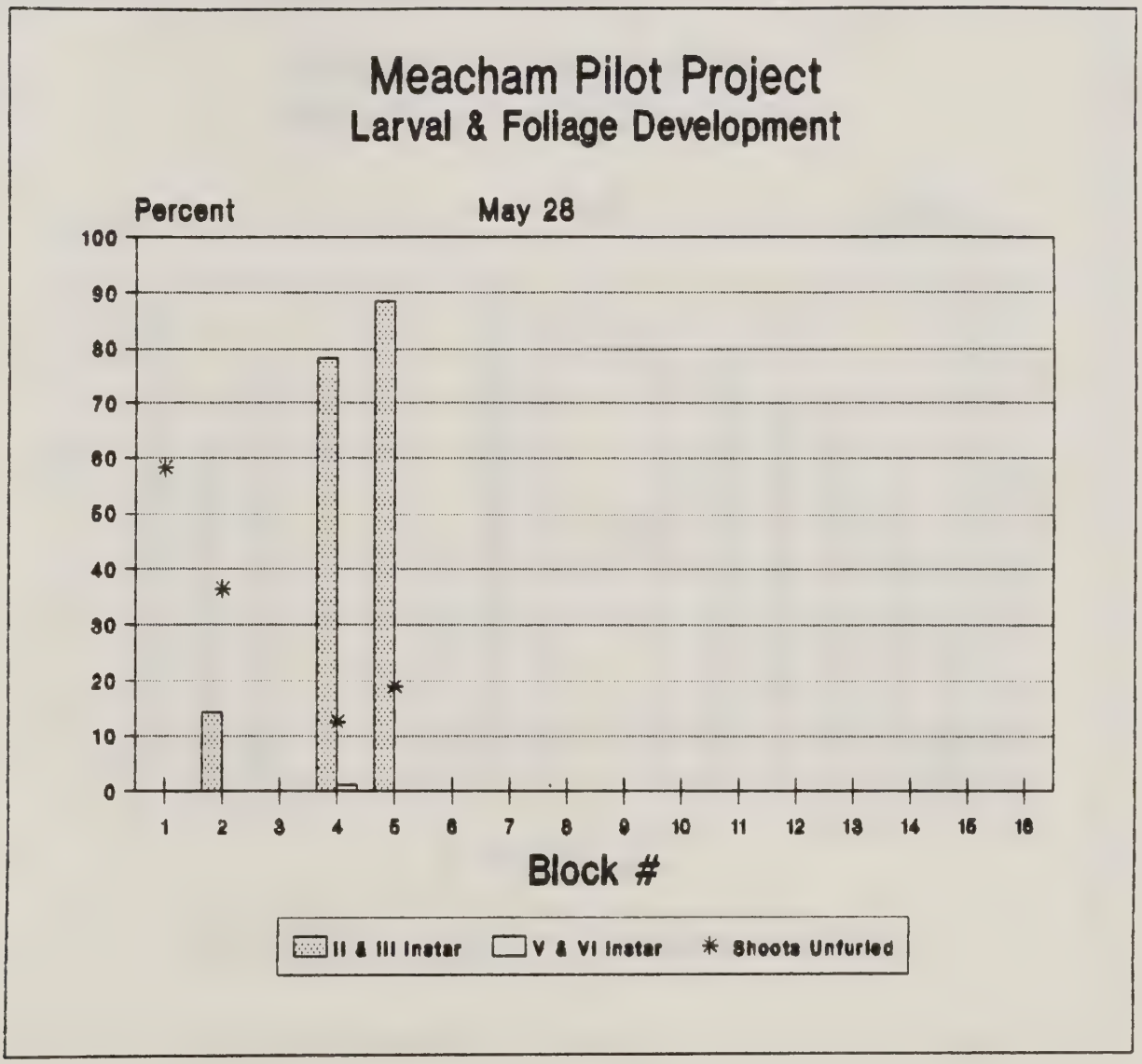
☆U.S. GOVERNMENT PRINTING OFFICE: 1978-261-647/3587

APPENDIX A

Meacham Pilot Project
Larval & Foliage Development




Meacham Pilot Project
Larval & Foliage Development
Percent
May 27
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Block #
II & III Instar
V & VI Instar
Shoots Unfurled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Larval & Foliage Development
Percent
May 28
100
90
80
70
60
50
40
30
20
10
0
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2
3
4
5
6
7
8
9
10
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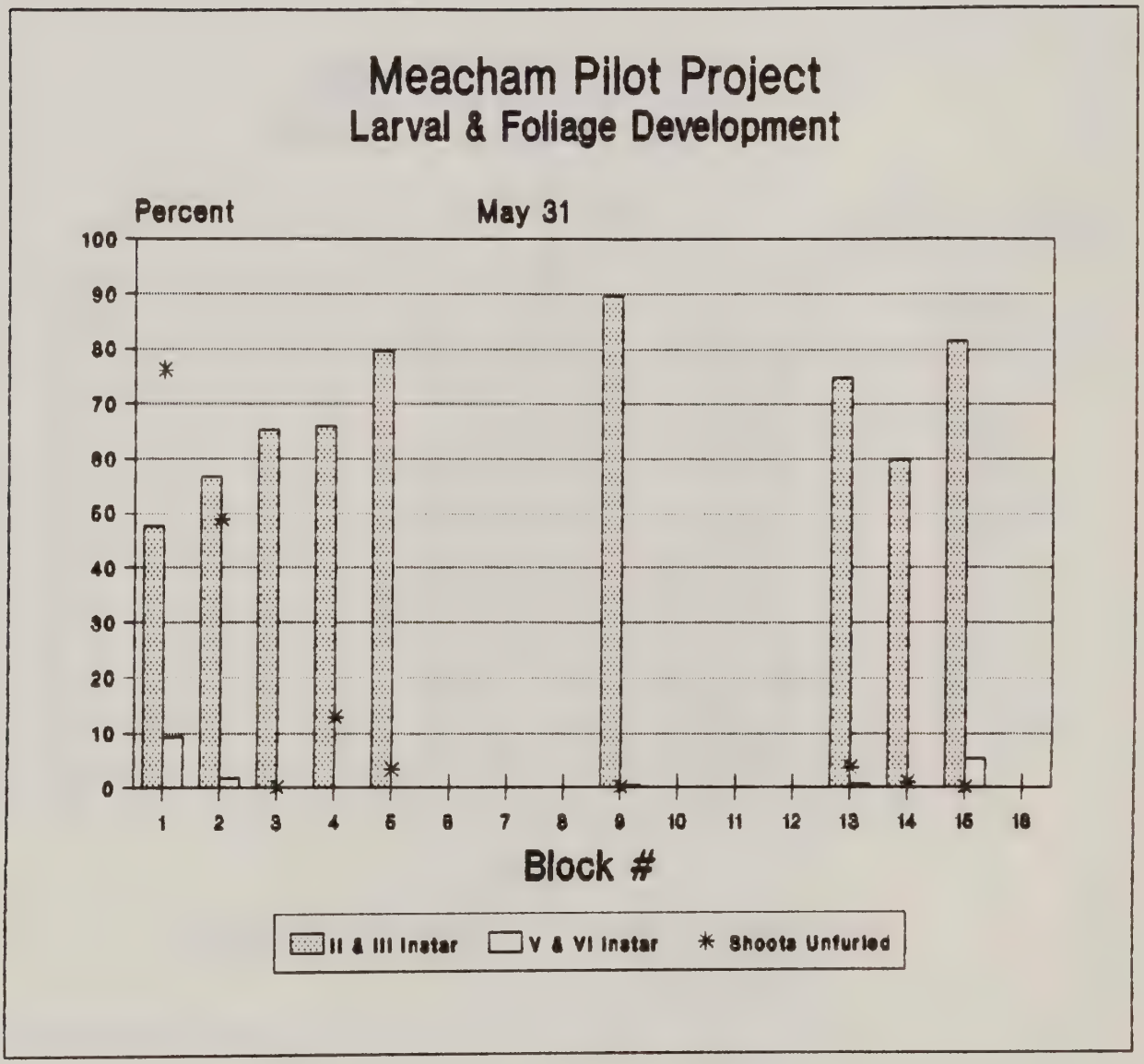
Block #
II & III Instar
V & VI Instar
Shoots Unfurled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Larval & Foliage Development
Percent
May 31
100
90
80
70
60
50
40
30
20
10
0
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3
4
5
6
7
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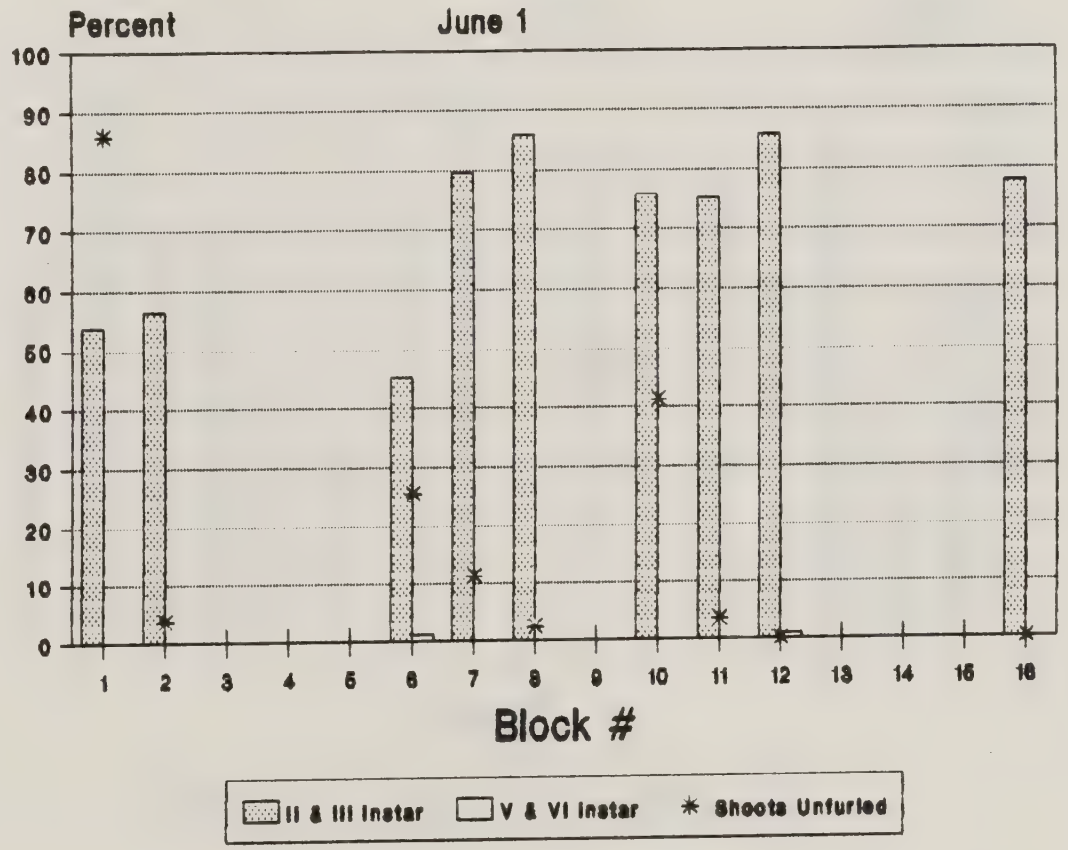
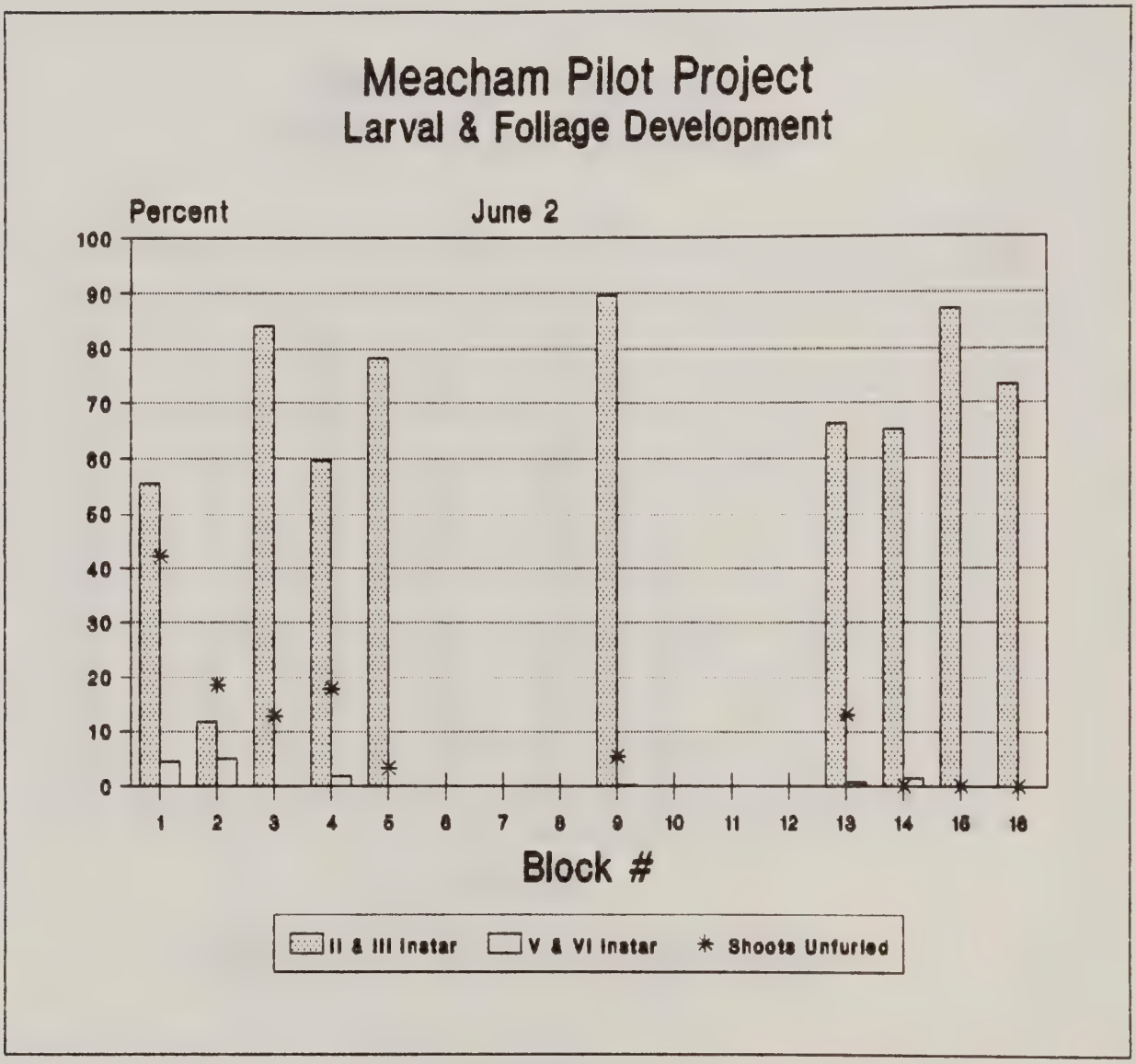
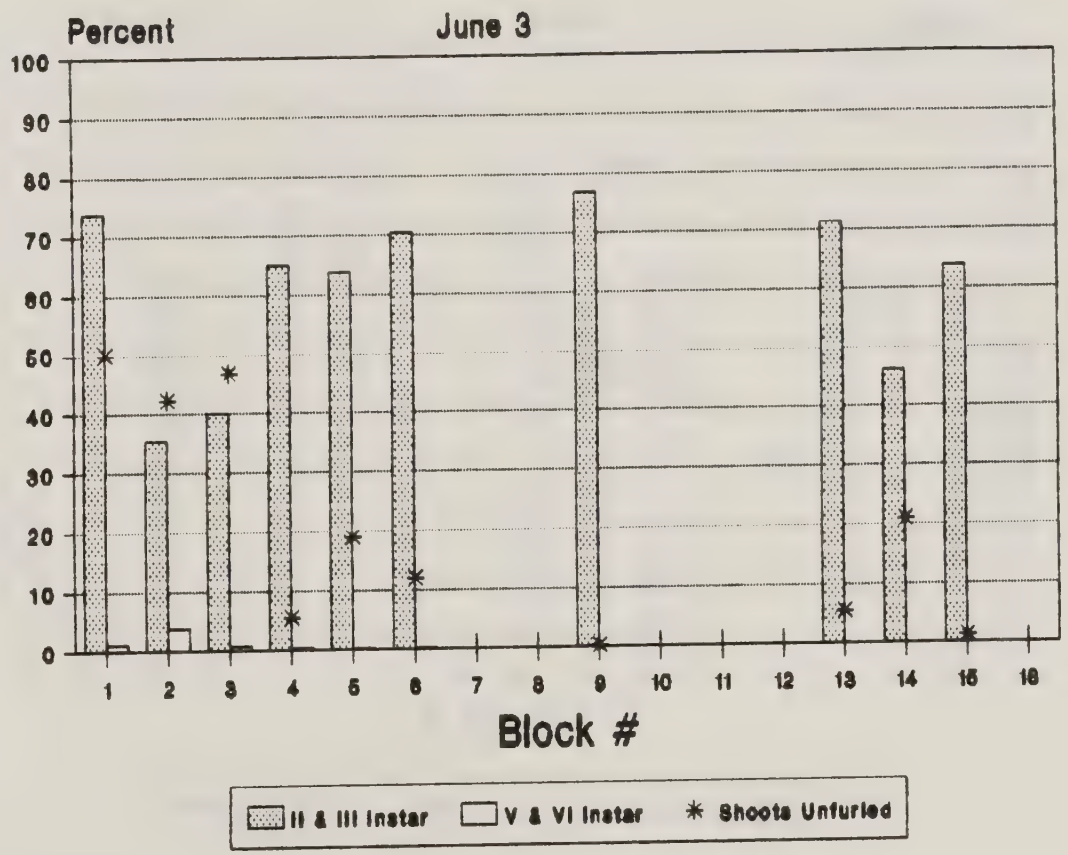
Block #
II & III Instar
V & VI Instar
Shoots Unfurled

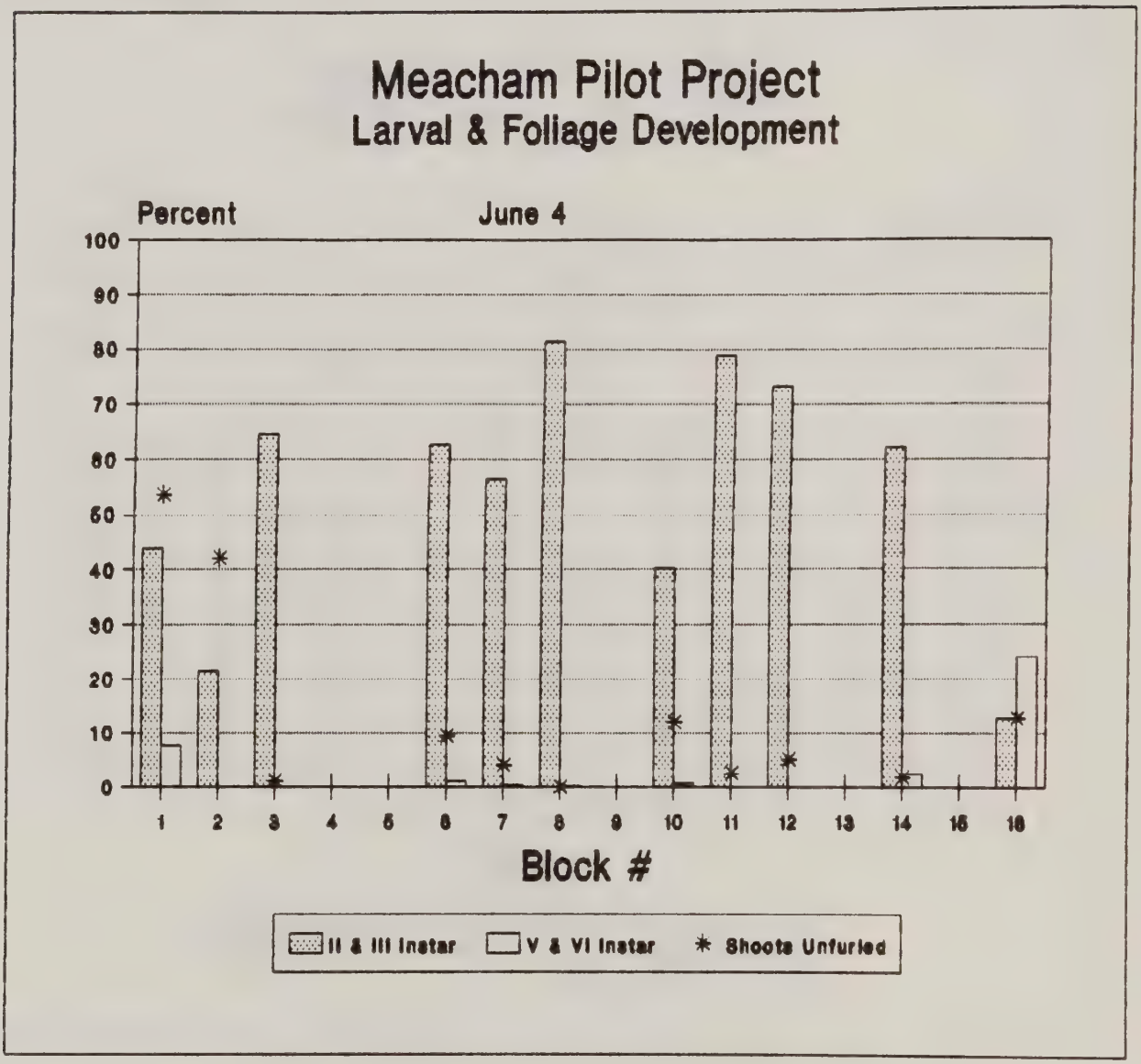
Meacham Pilot Project
Larval & Foliage Development




Meacham Pilot Project
Larval & Foliage Development
Percent
June 2
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Block #
II & III Instar
V & VI Instar
Shoots Unfurled

Meacham Pilot Project
Larval & Foliage Development

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Larval & Foliage Development
Percent
June 4
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
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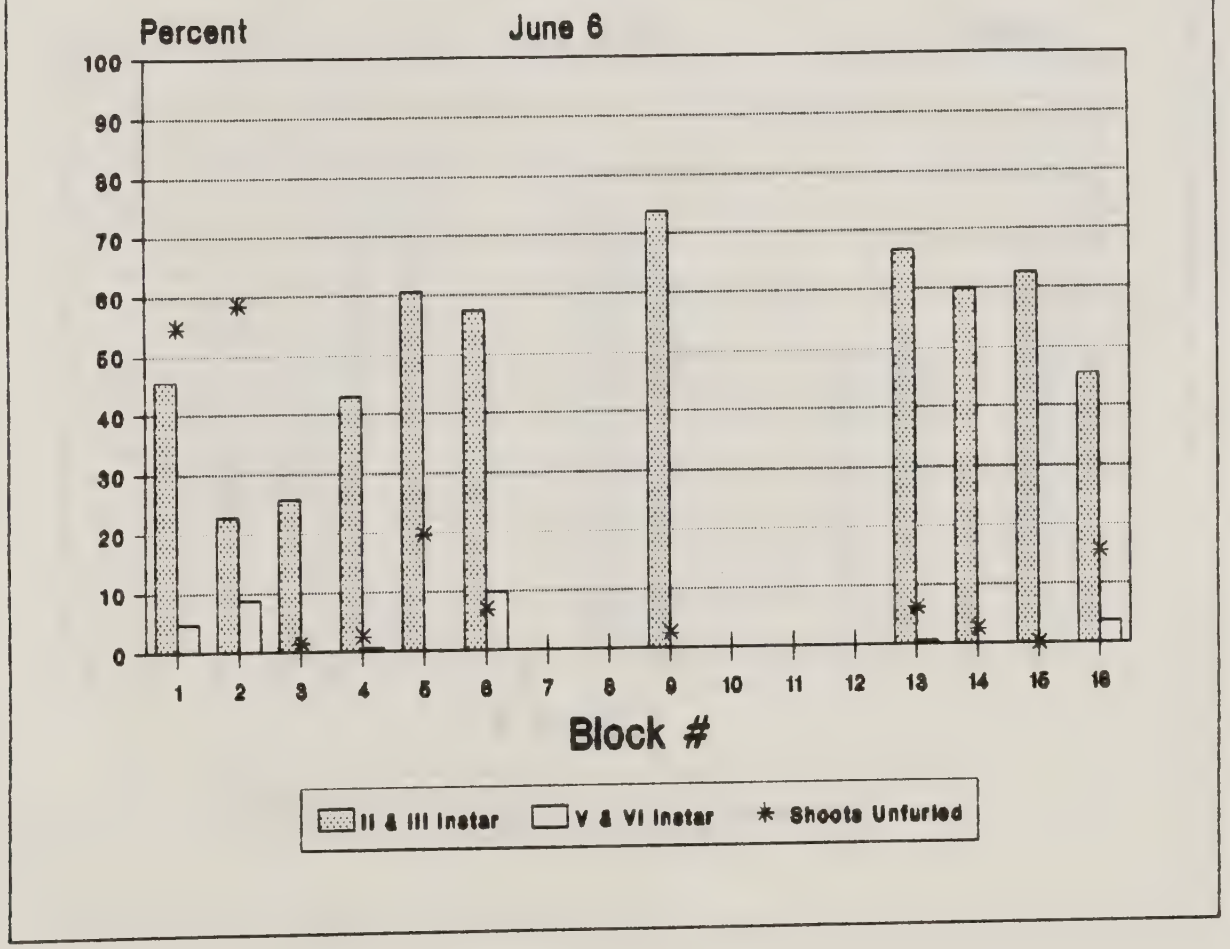
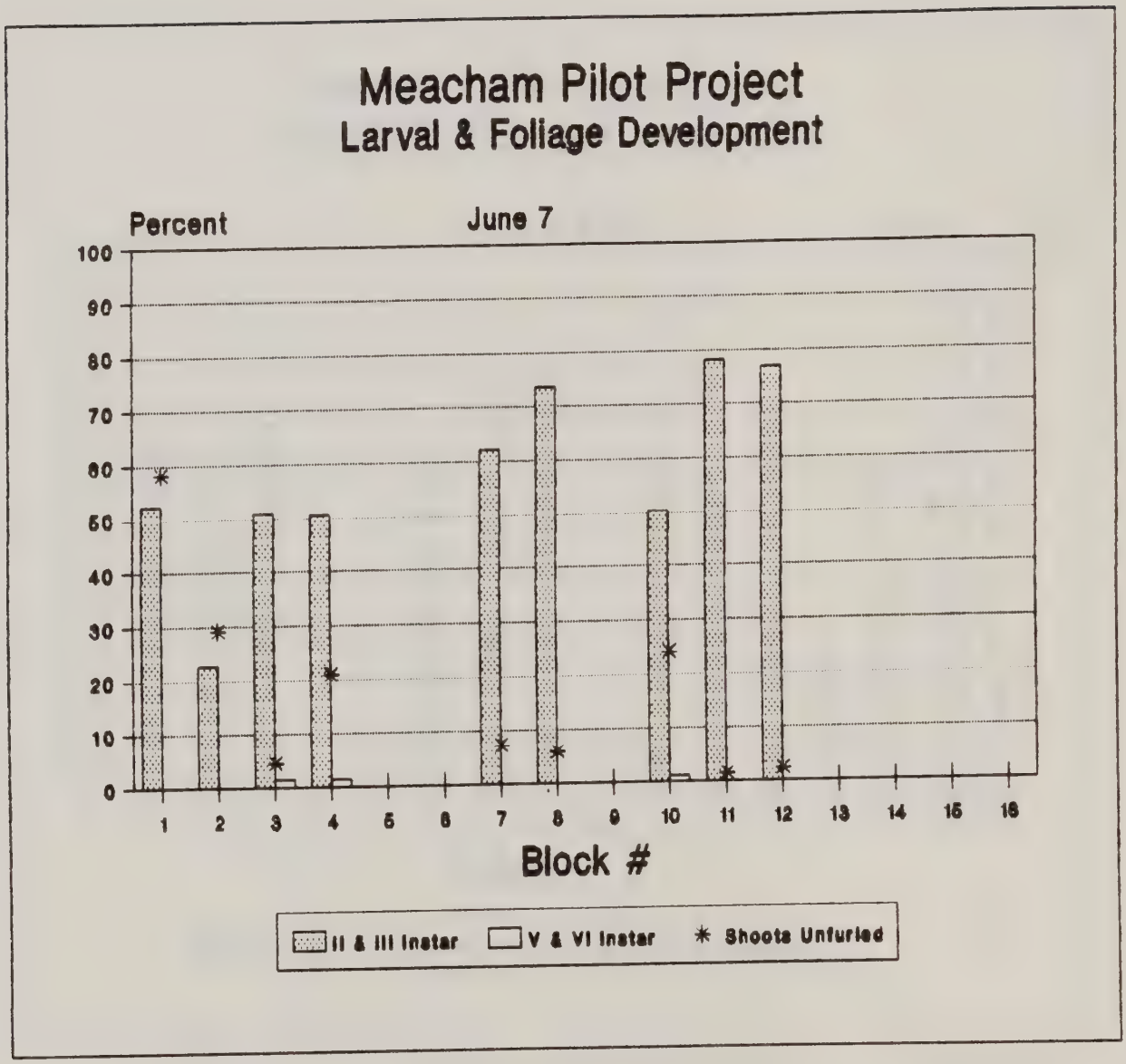
6
7
8
9
10
11
12
13
14
15
16
Block #
II & III Instar
V & VI Instar
Shoots Unfurled

Meacham Pilot Project
Larval & Foliage Development




Meacham Pilot Project
Larval & Foliage Development
Percent
June 7
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
5
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10
11
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13
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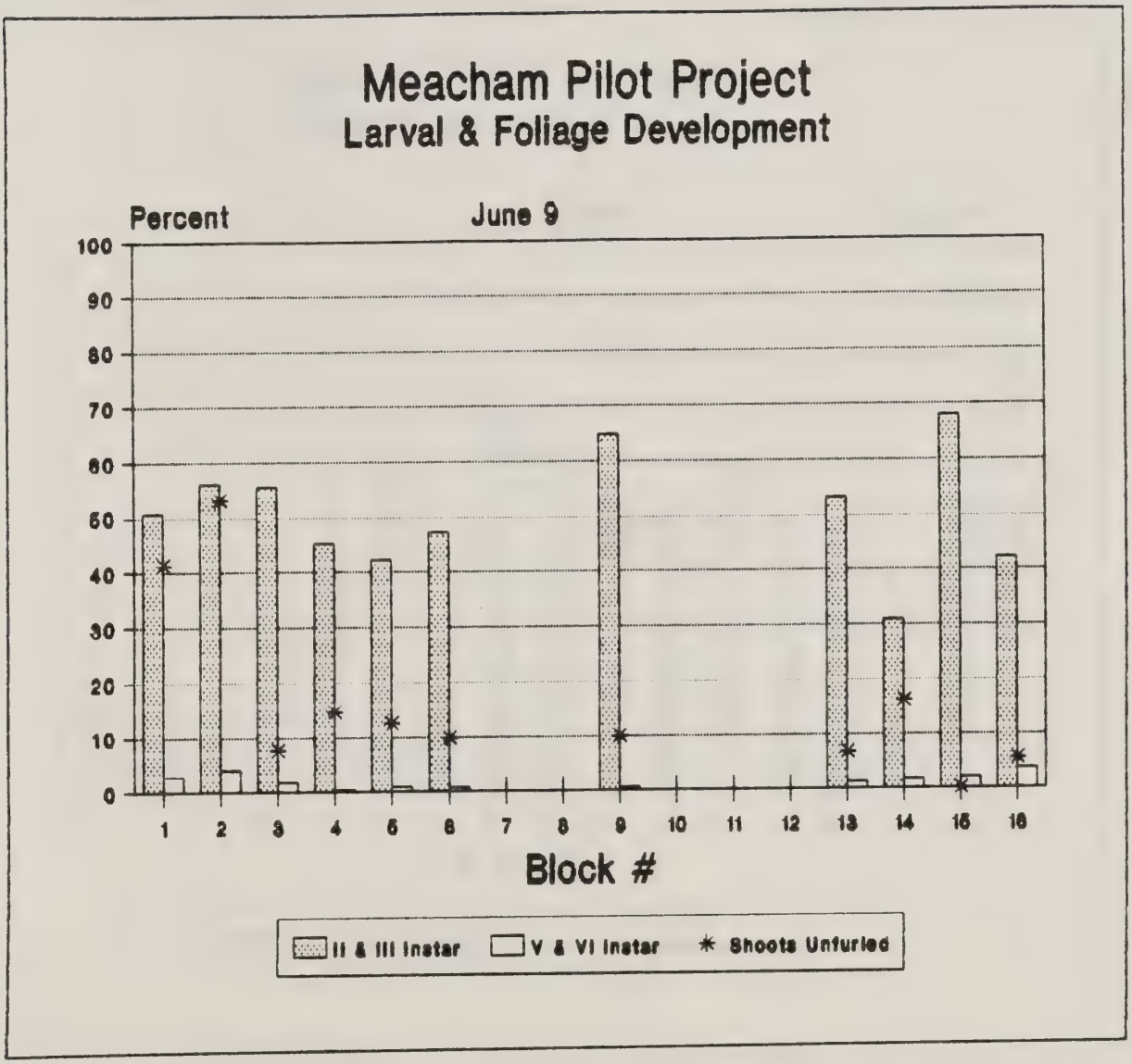
15
16
Block #
II & III Instar
V & VI Instar
Shoots Unfurled


Meacham Pilot Project
Larval & Foliage Development
Percent
June 9
100
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80
70
60
50
40
30
20
10
0
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2
3
4
5
6
7
8
9
10
11
12
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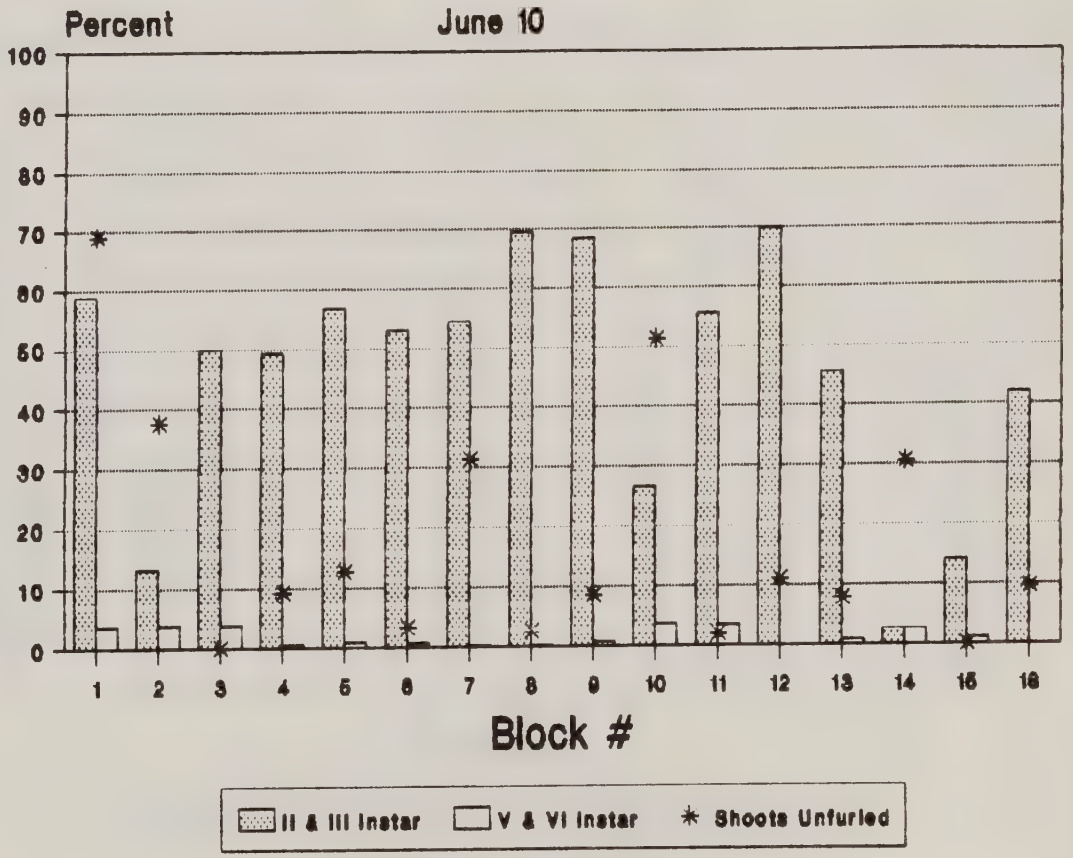
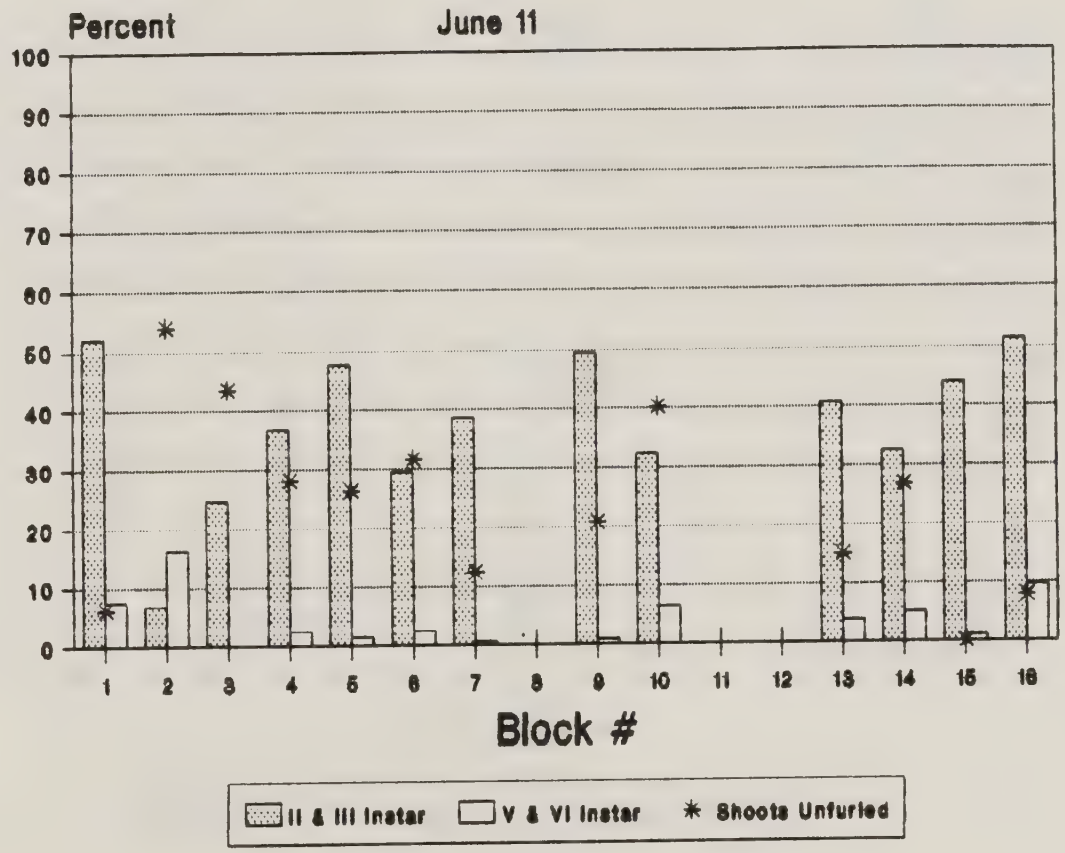
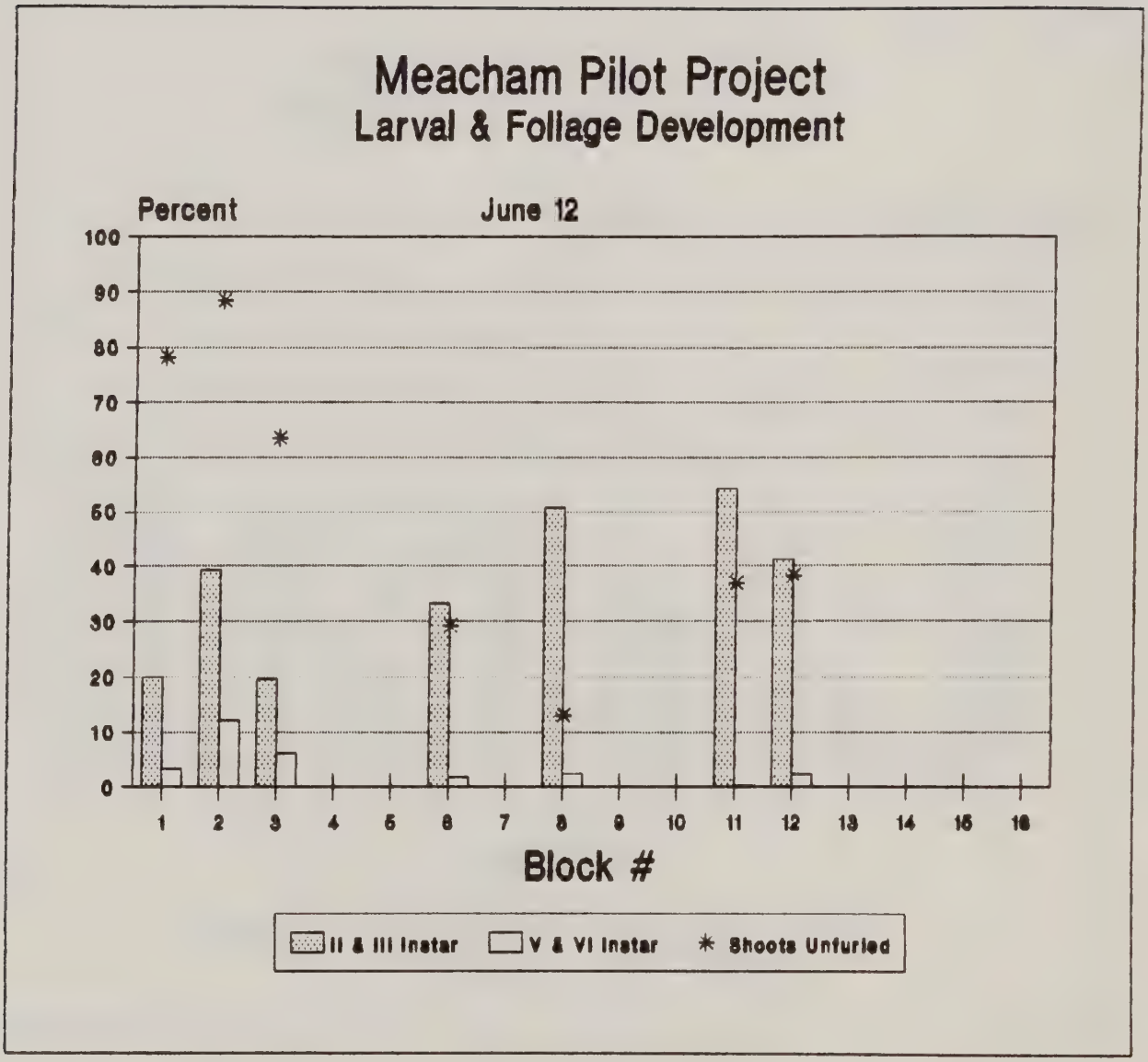
14
15
16
Block #
II & III Instar
V & VI Instar
Shoots Unfurled

Meacham Pilot Project
Larval & Foliage Development



Meacham Pilot Project
Larval & Foliage Development




Meacham Pilot Project
Larval & Foliage Development
Percent
June 12
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
5
6
7
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9
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11
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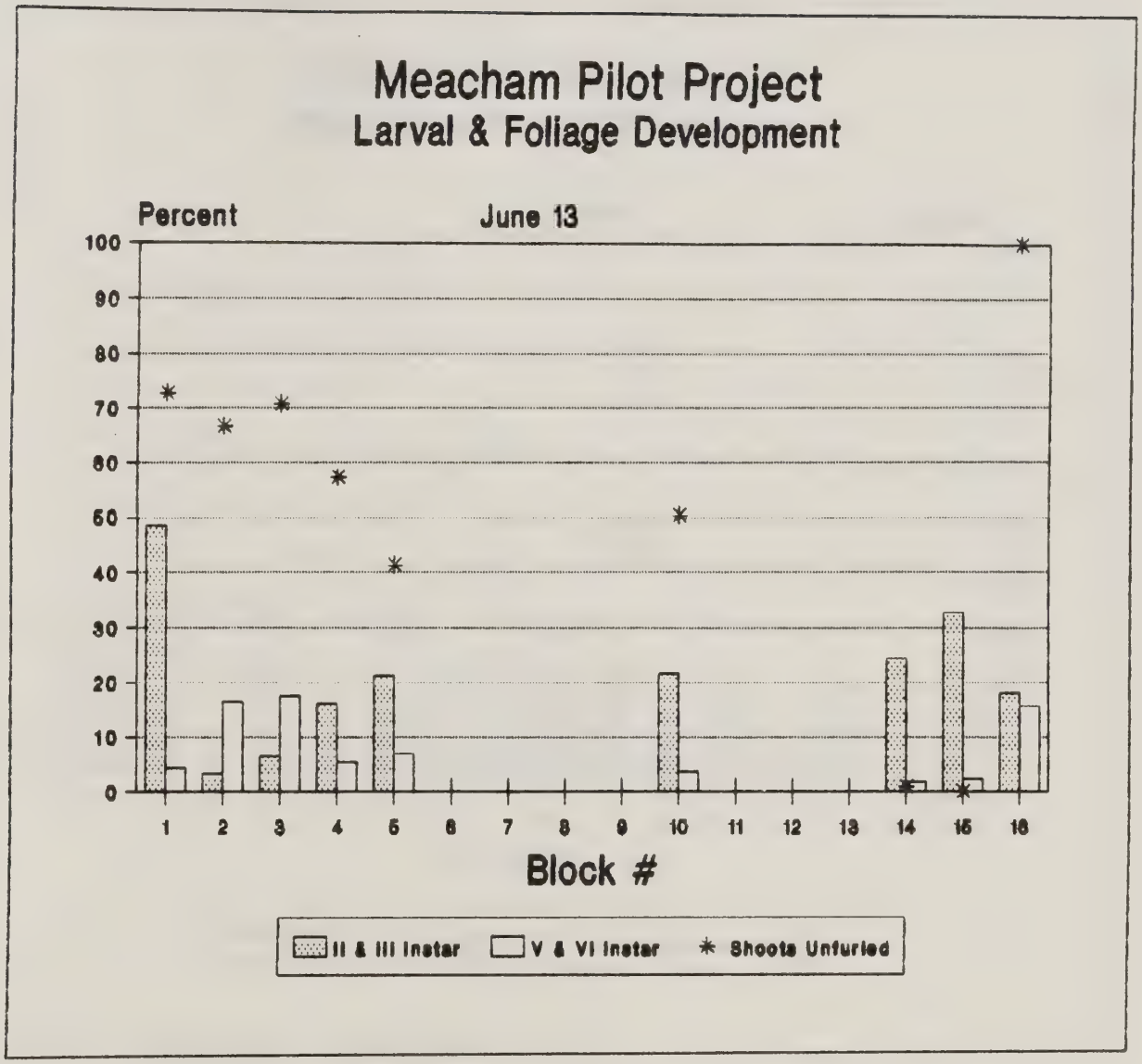
13
14
15
16
Block #
II & III Instar
V & VI Instar
Shoots Unfurled


Meacham Pilot Project
Larval & Foliage Development
Percent
June 13
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
5
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7
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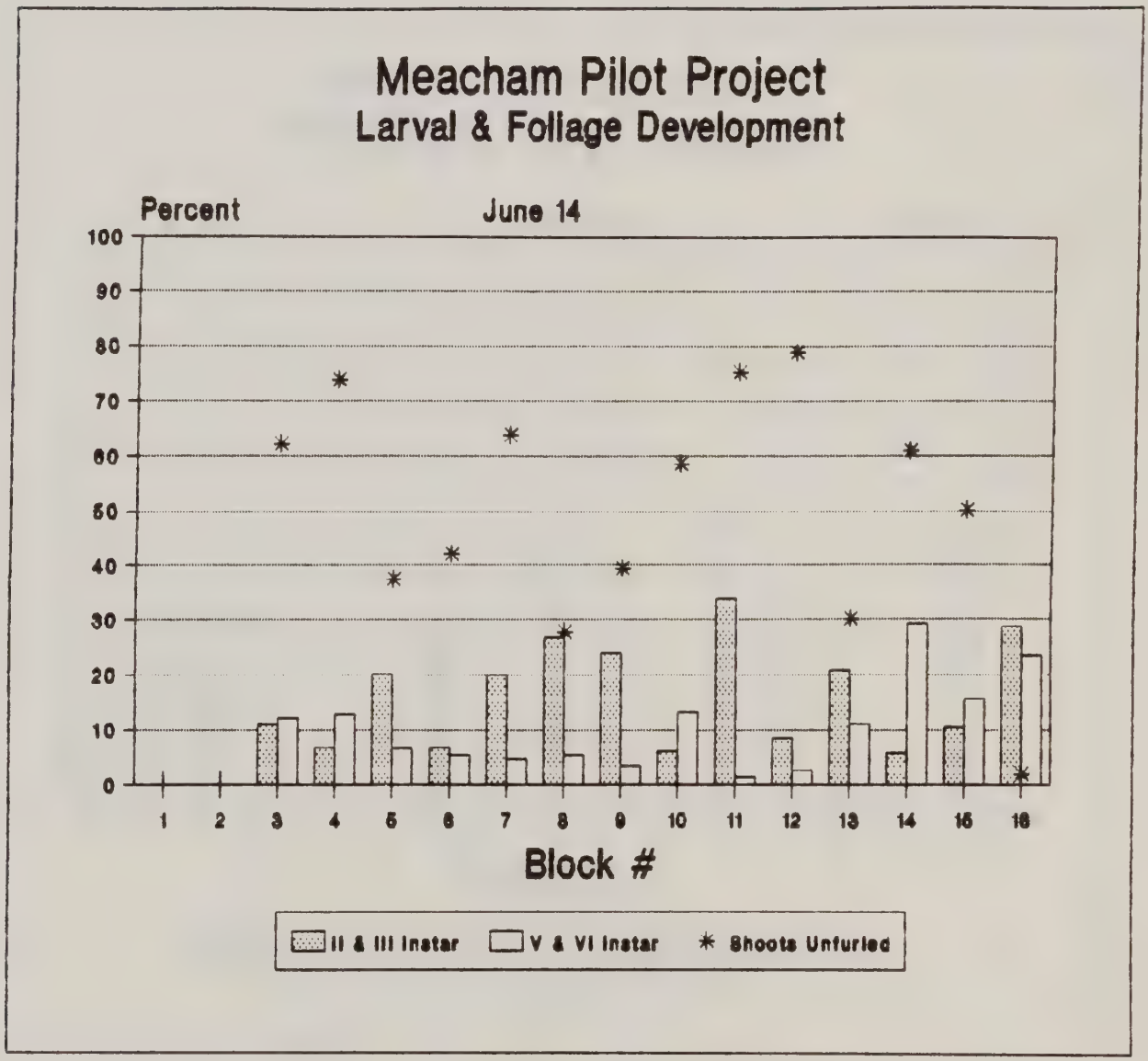
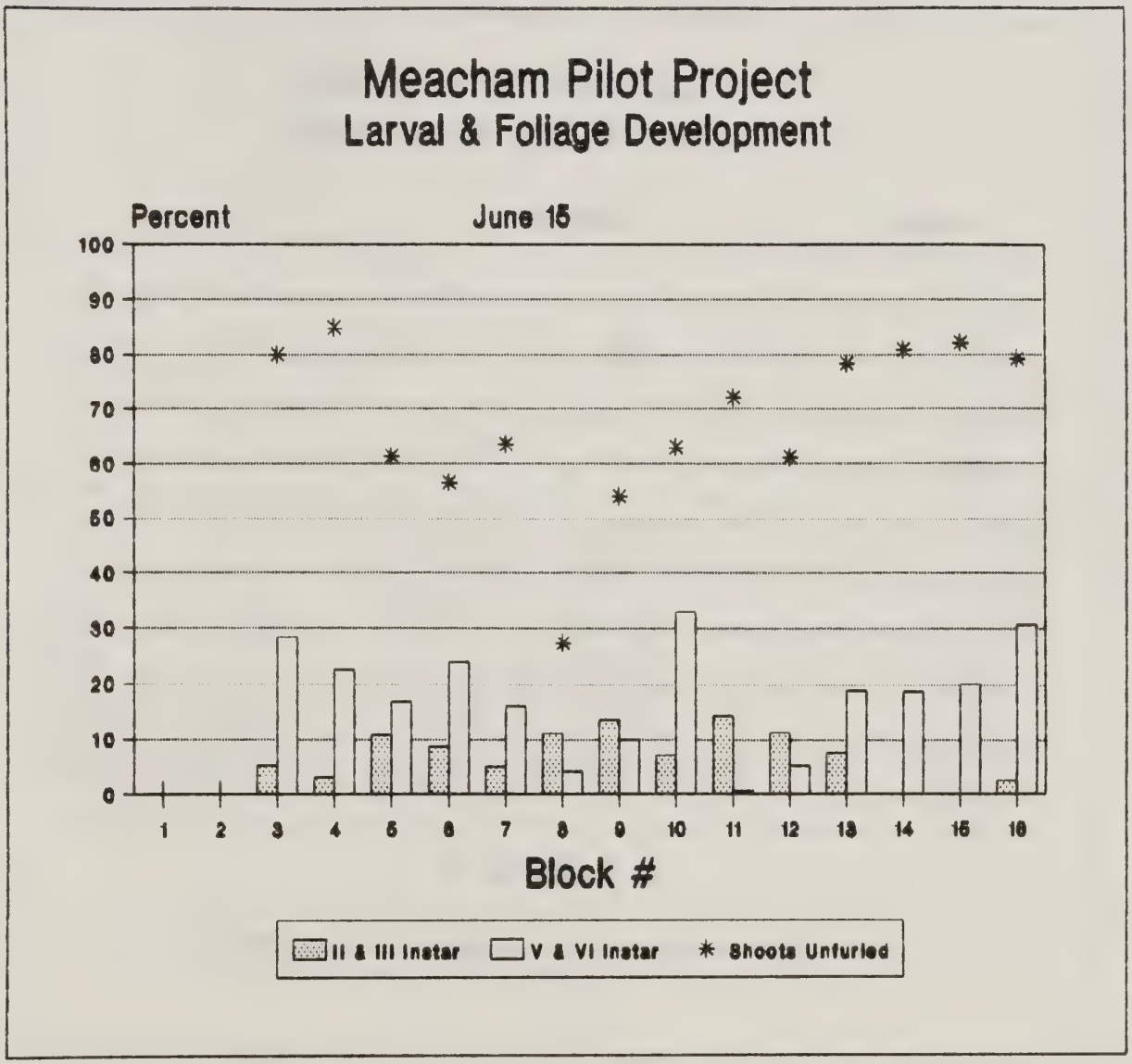
13
14
15
16
Block #
II & III Instar
V & VI Instar
Shoots Unfurled


Meacham Pilot Project
Larval & Foliage Development
Percent
June 14
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Block #
II & III Instar
V & VI Instar
Shoots Unfurled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Larval & Foliage Development
Percent
June 15
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70
60
50
40
30
20
10
0
1
2
3
4
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11
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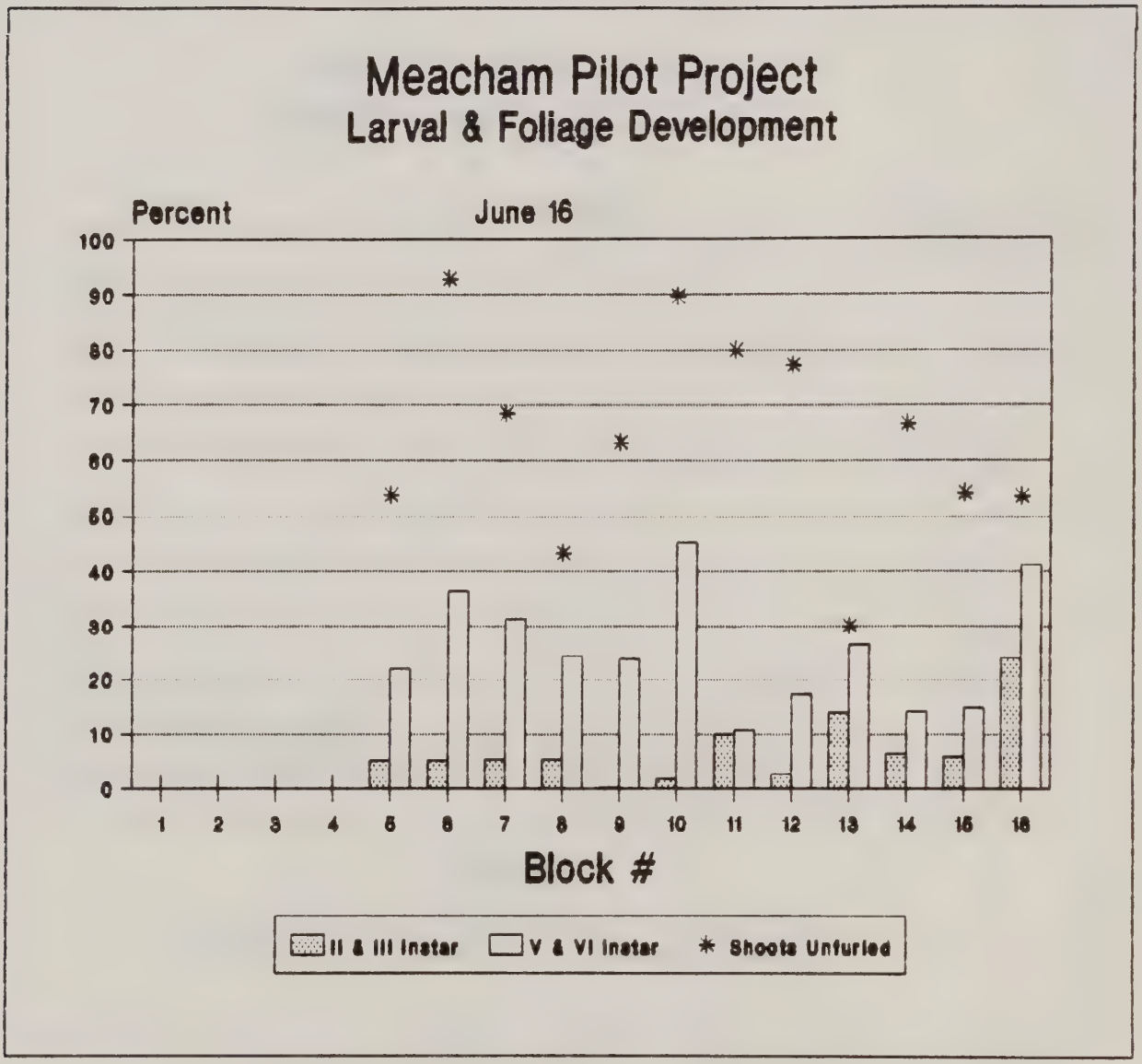
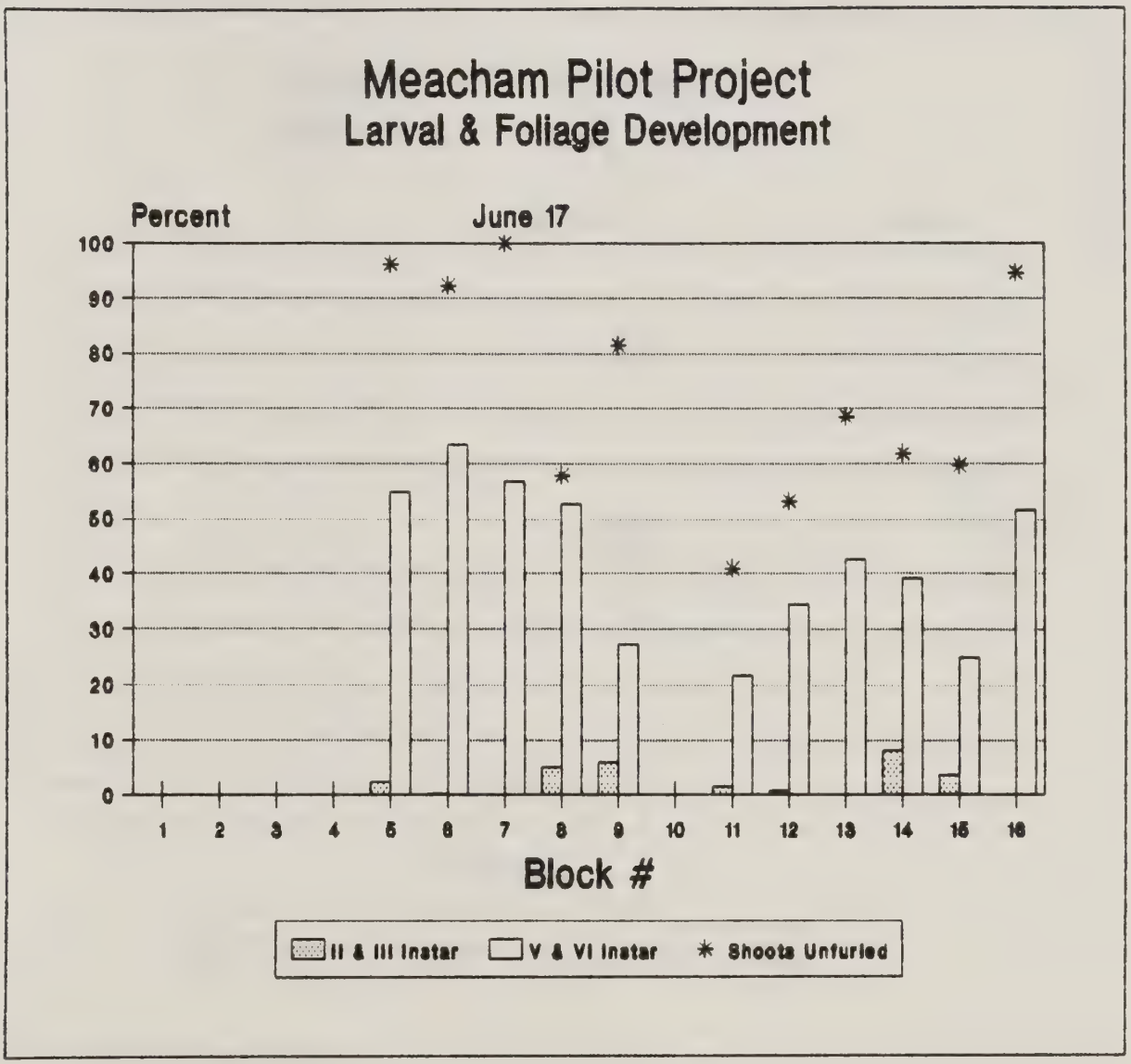
13
14
15
16
Block #
II & III Instar
V & VI Instar
Shoots Unfurled


Meacham Pilot Project
Larval & Foliage Development
Percent
June 16
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Block #
II & III Instar
V & VI Instar
Shoots Unfurled


Meacham Pilot Project
Larval & Foliage Development
Percent
June 17
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
5
6
7
8
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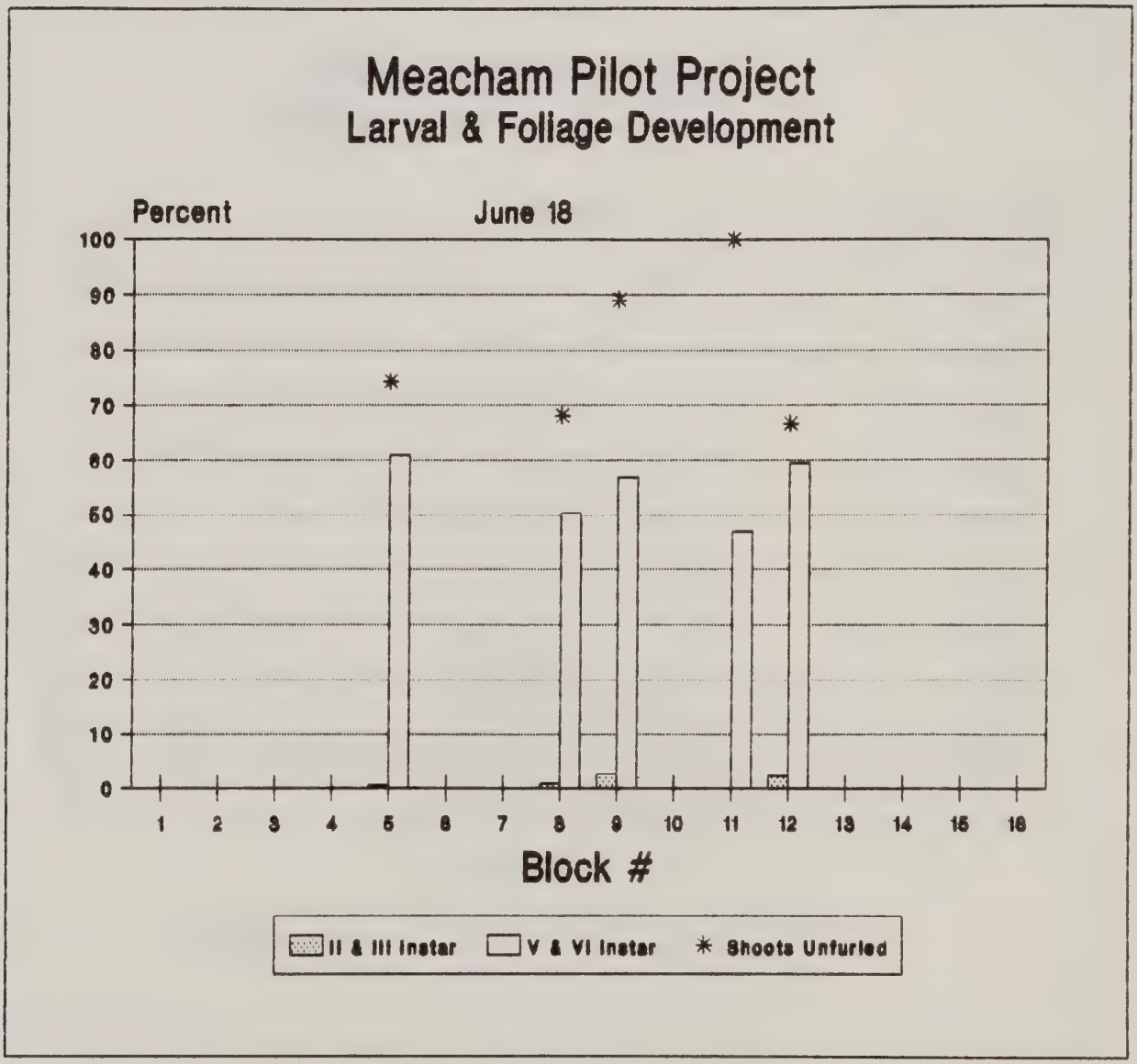
10
11
12
13
14
15
16
Block #
II & III Instar
V & VI Instar
Shoots Unfurled


Meacham Pilot Project
Larval & Foliage Development
Percent
June 18
100
90
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70
60
50
40
30
20
10
0
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3
4
5
6
7
8
9
10
11
12
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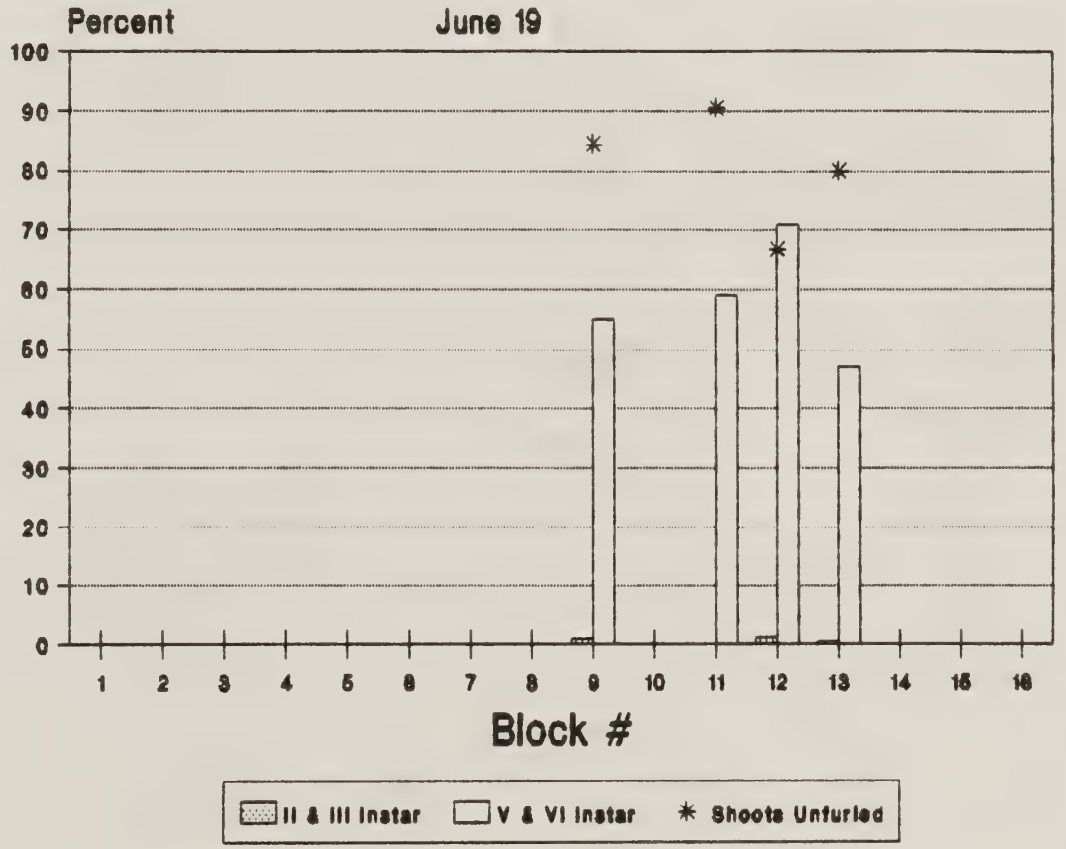
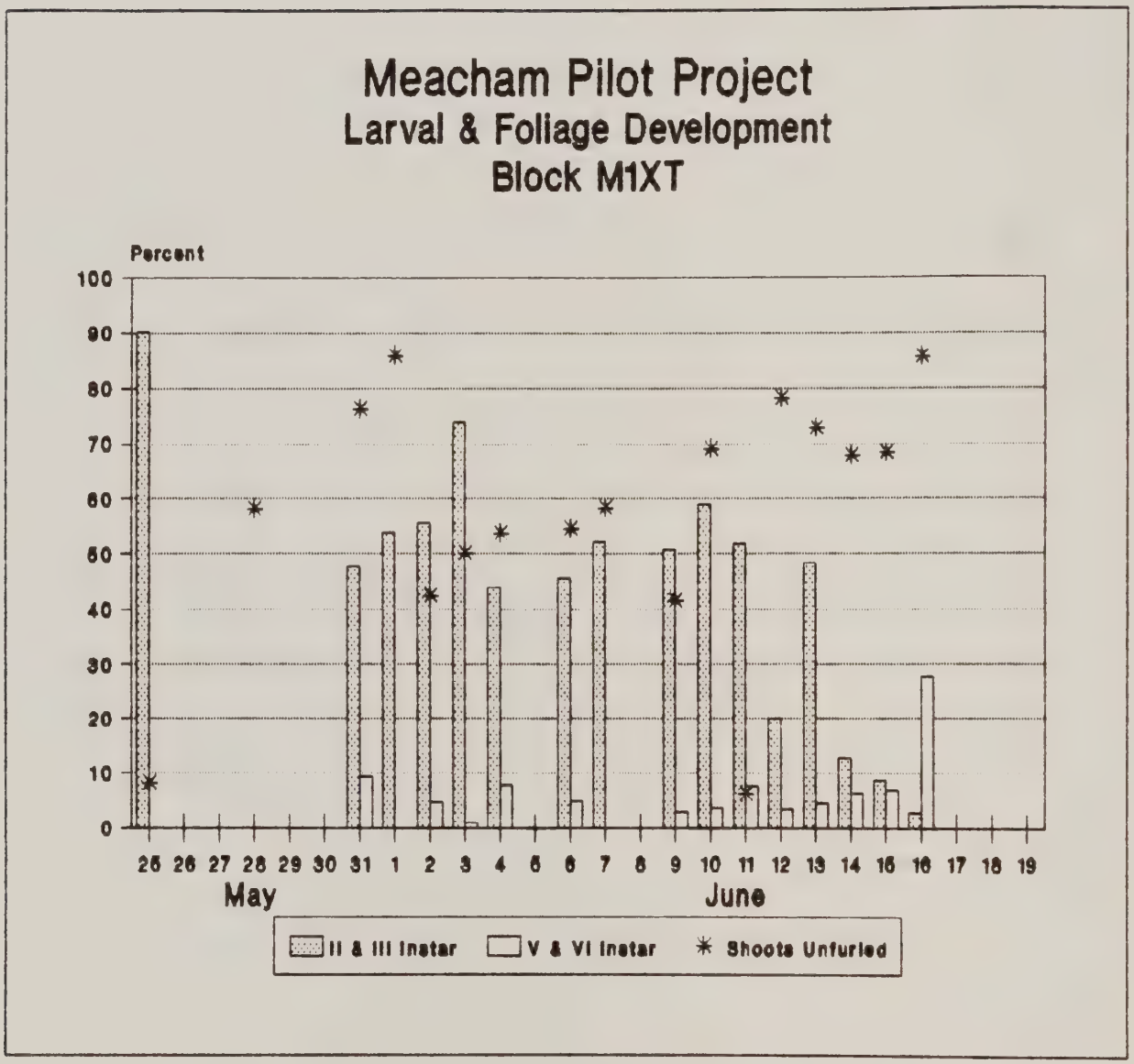
15
16
Block #
II & III Instar
V & VI Instar
Shoots Unfurled

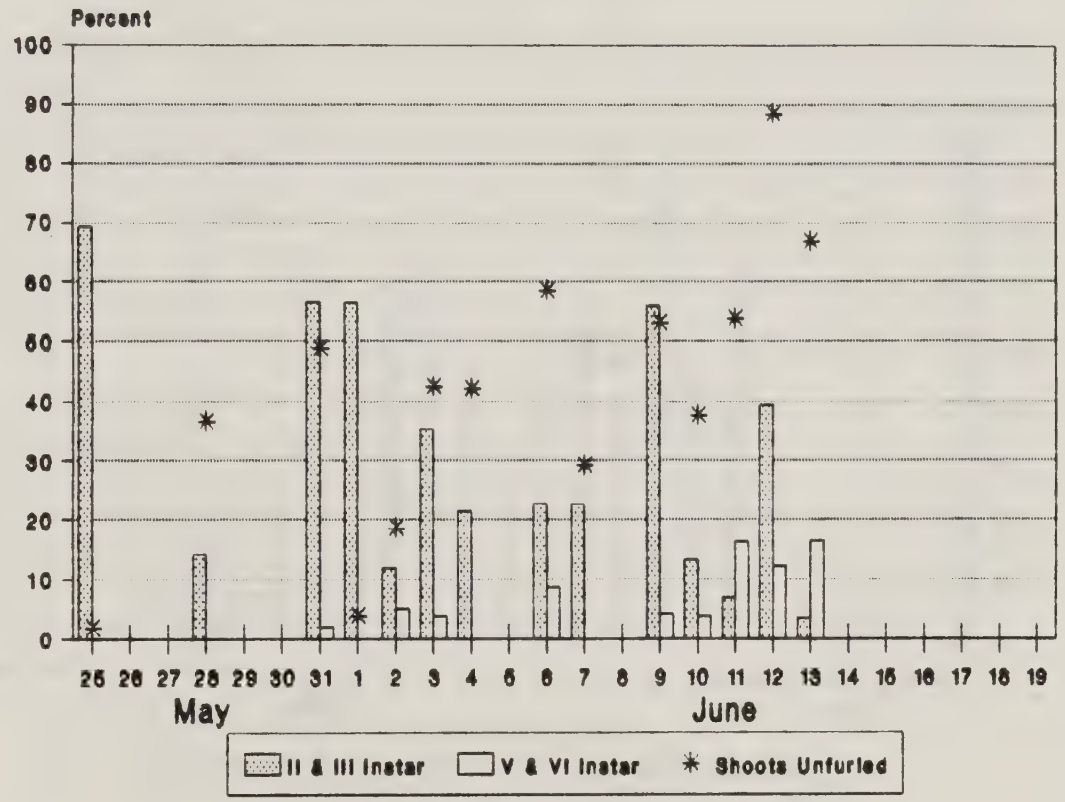
Meacham Pilot Project
Larval & Foliage Development



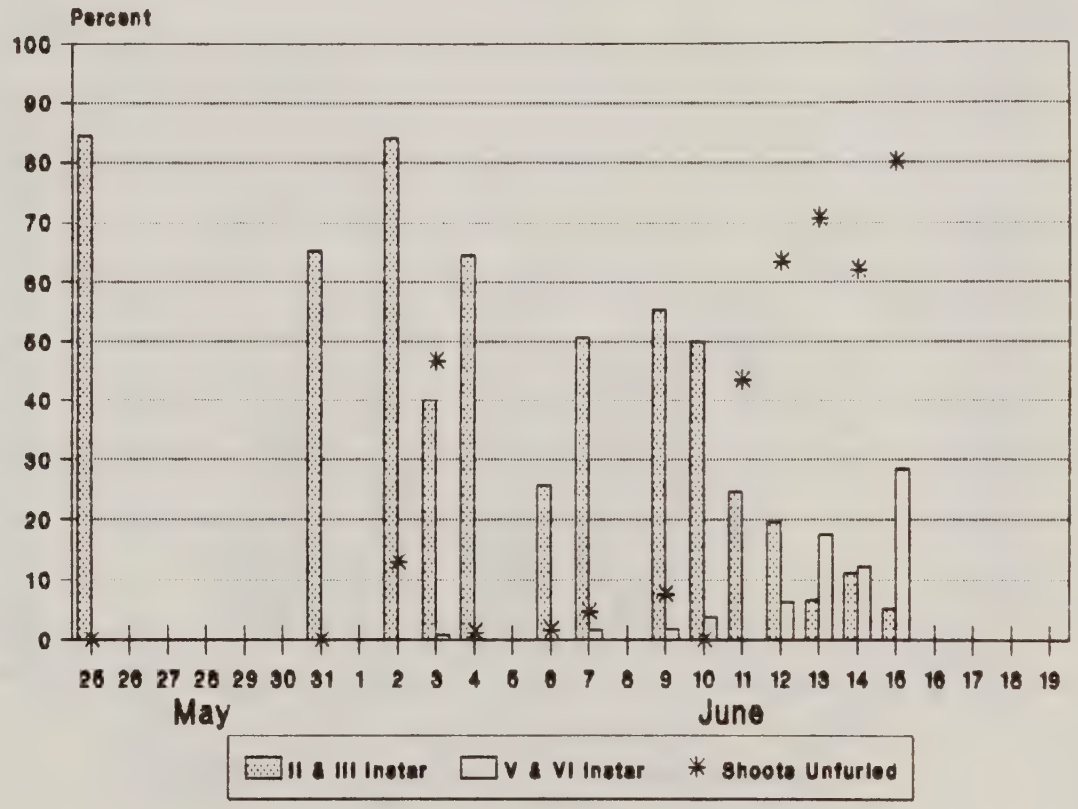
APPENDIX B


Meacham Pilot Project
Larval & Foliage Development
Block M1XT
Percent
100
90
80
70
60
50
40
30
20
10
0
25 26 27 28 29 30 31 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
May
June
II & III Instar
V & VI Instar
Shoots Unfurled

Meacham Pilot Project
Larval & Foliage Development
Block M2XD



Meacham Pilot Project
Larval & Foliage Development
Block M3XT



Meacham Pilot Project
Larval & Foliage Development
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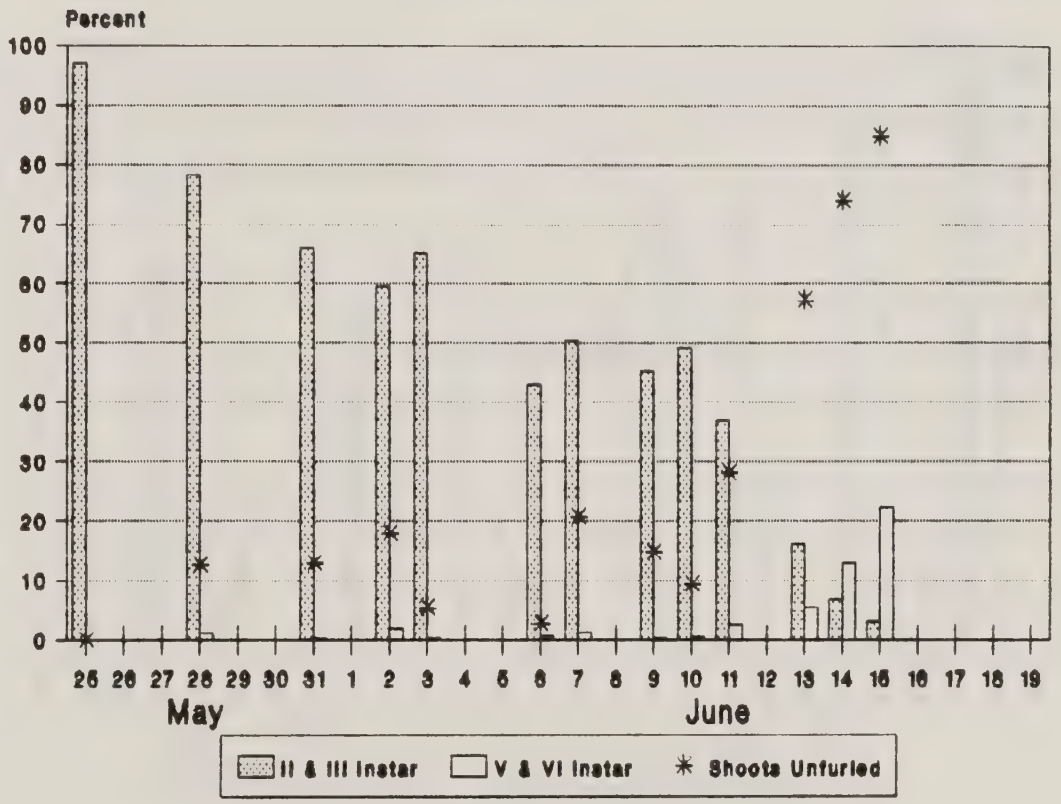
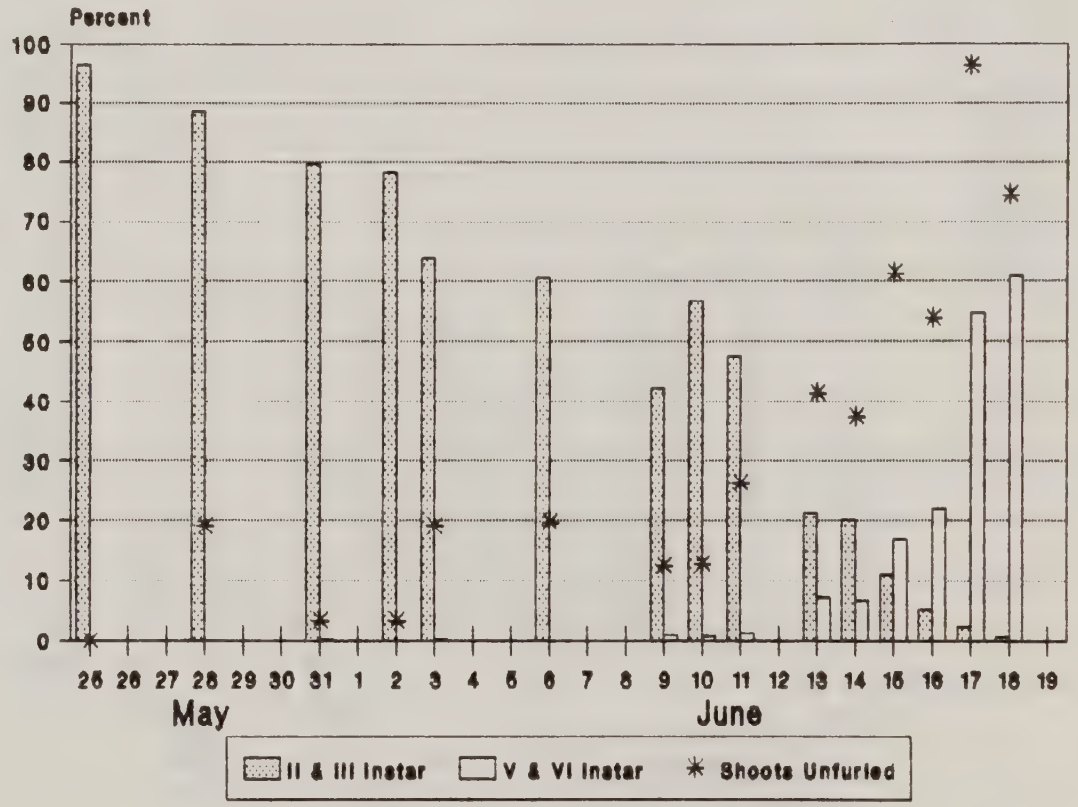


Meacham Pilot Project
Larval & Foliage Development
Block M5T



Meacham Pilot Project
Larval & Foliage Development
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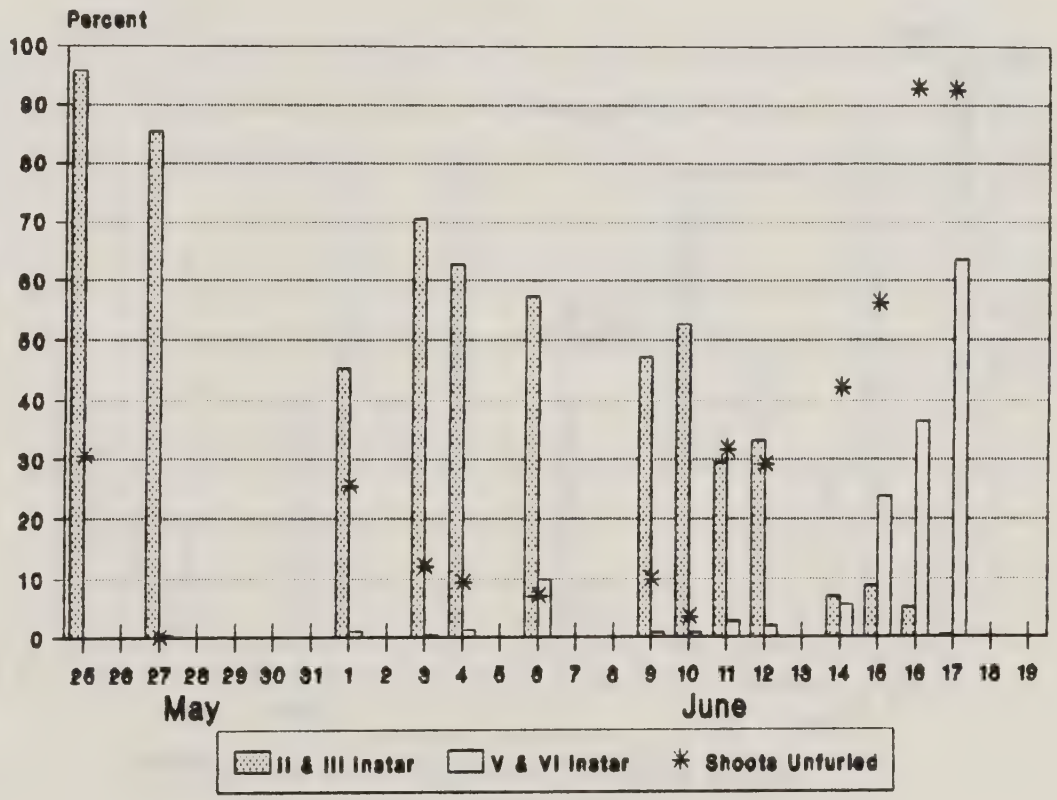
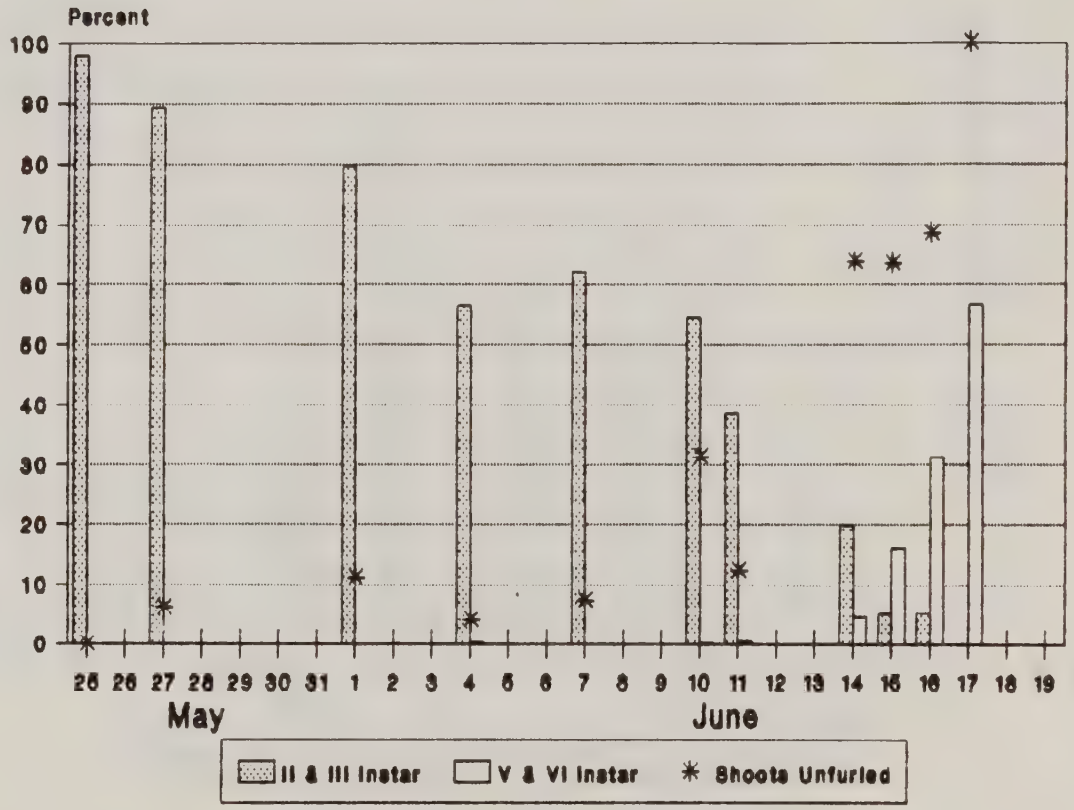
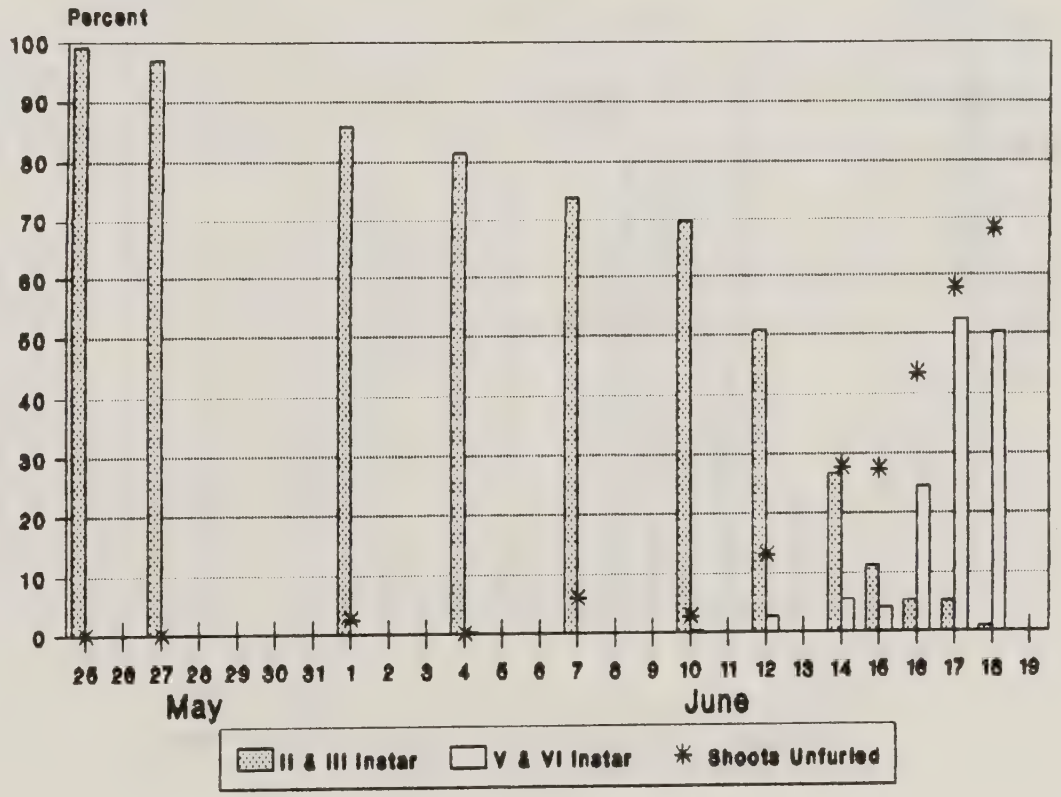


Meacham Pilot Project
Larval & Foliage Development
Block M7C



Meacham Pilot Project
Larval & Foliage Development
Block M8T



Meacham Pilot Project
Larval & Foliage Development
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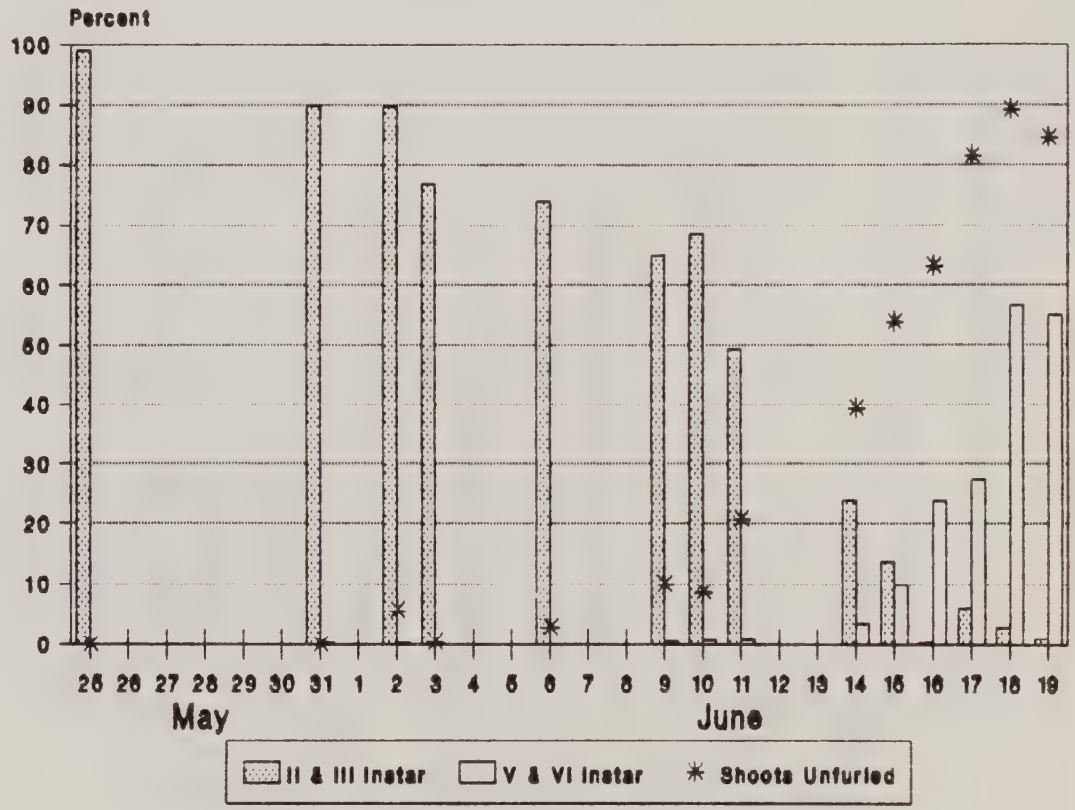
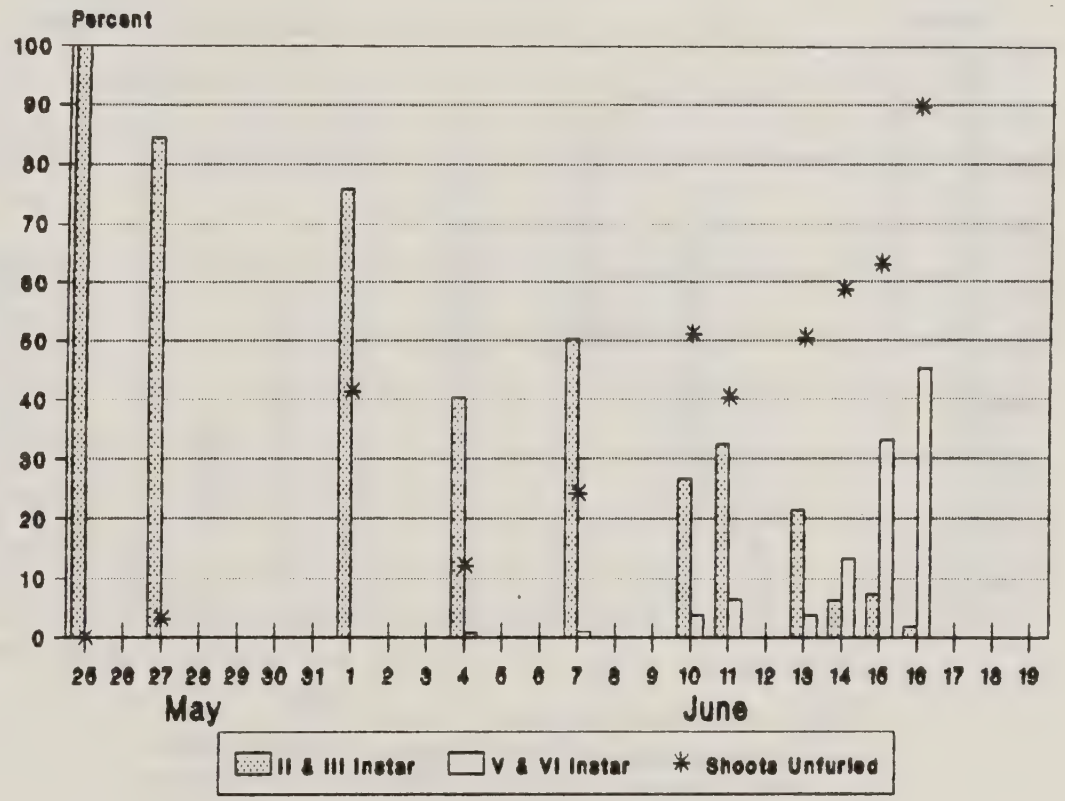
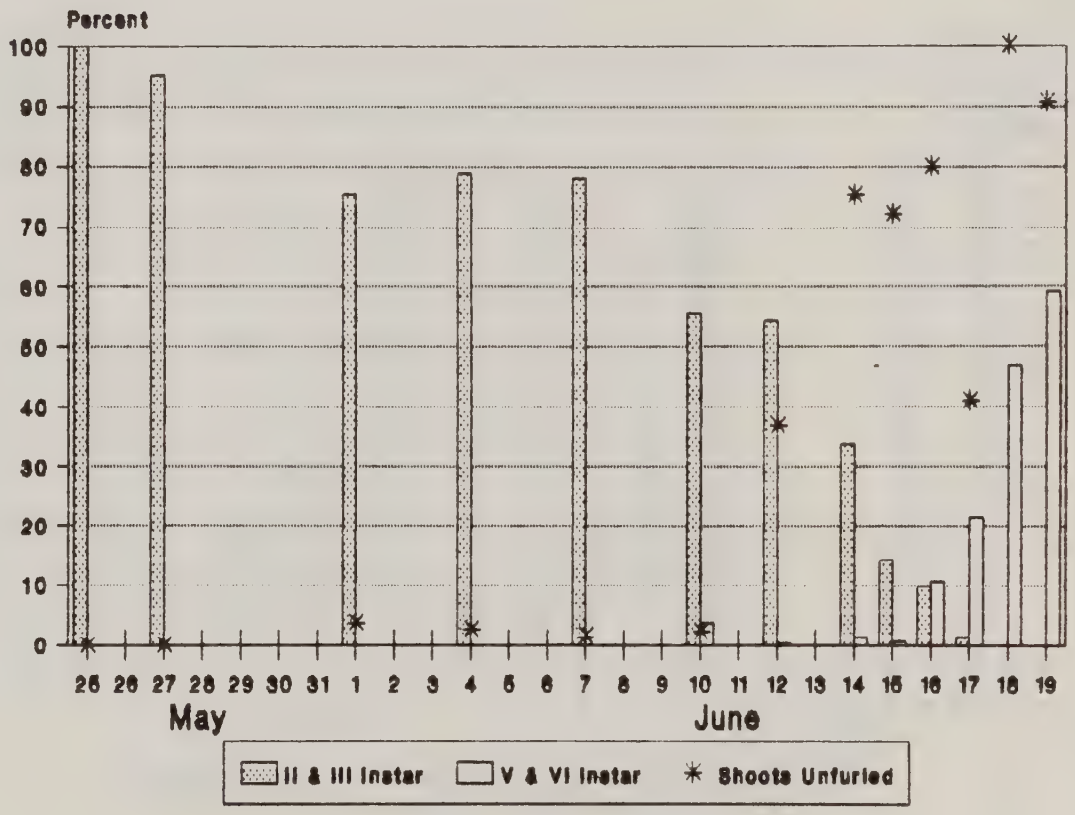


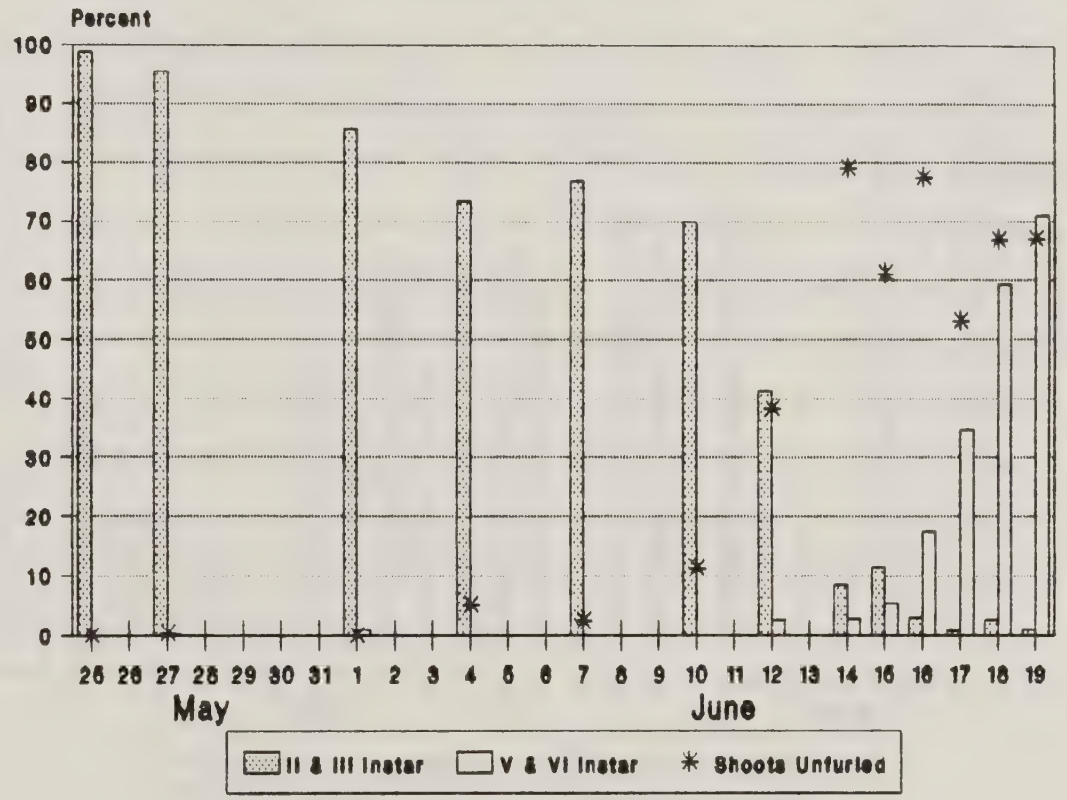
Meacham Pilot Project
Larval & Foliage Development
Block M10D



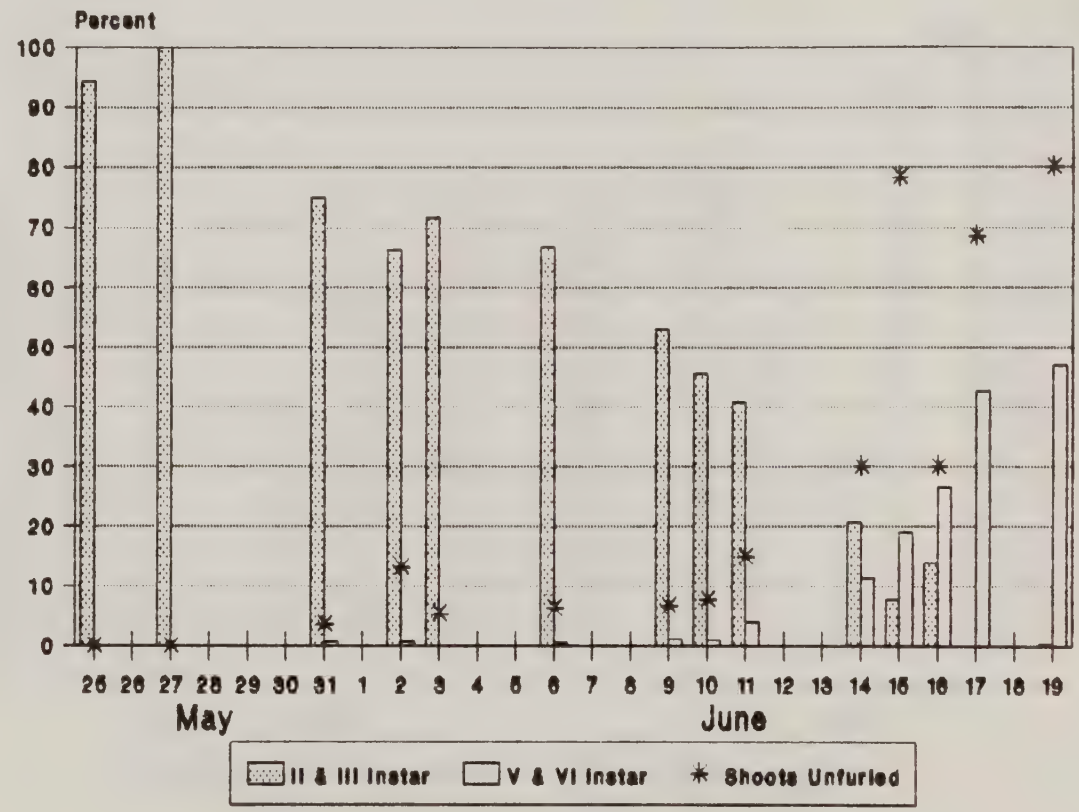
Meacham Pilot Project
Larval & Foliage Development
Block M11XT



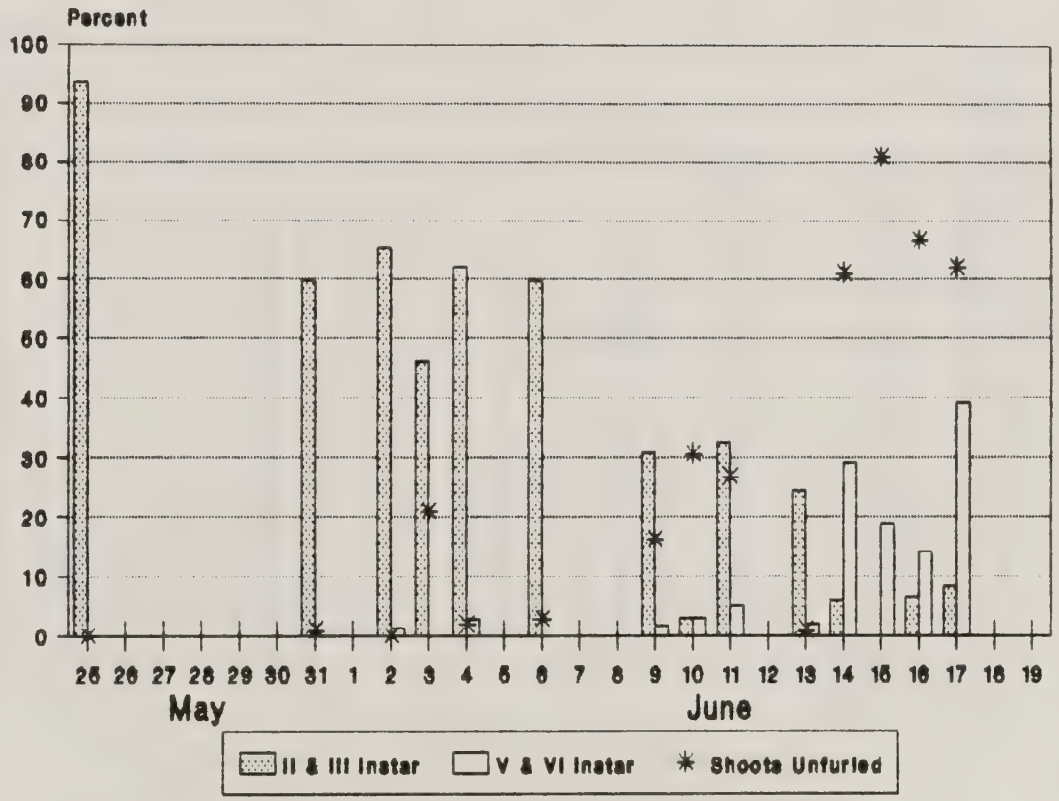
Meacham Pilot Project
Larval & Foliage Development
Block M12T



Meacham Pilot Project
Larval & Foliage Development
Block M13C



Meacham Pilot Project
Larval & Foliage Development
Block M14XT



Meacham Pilot Project
Larval & Foliage Development
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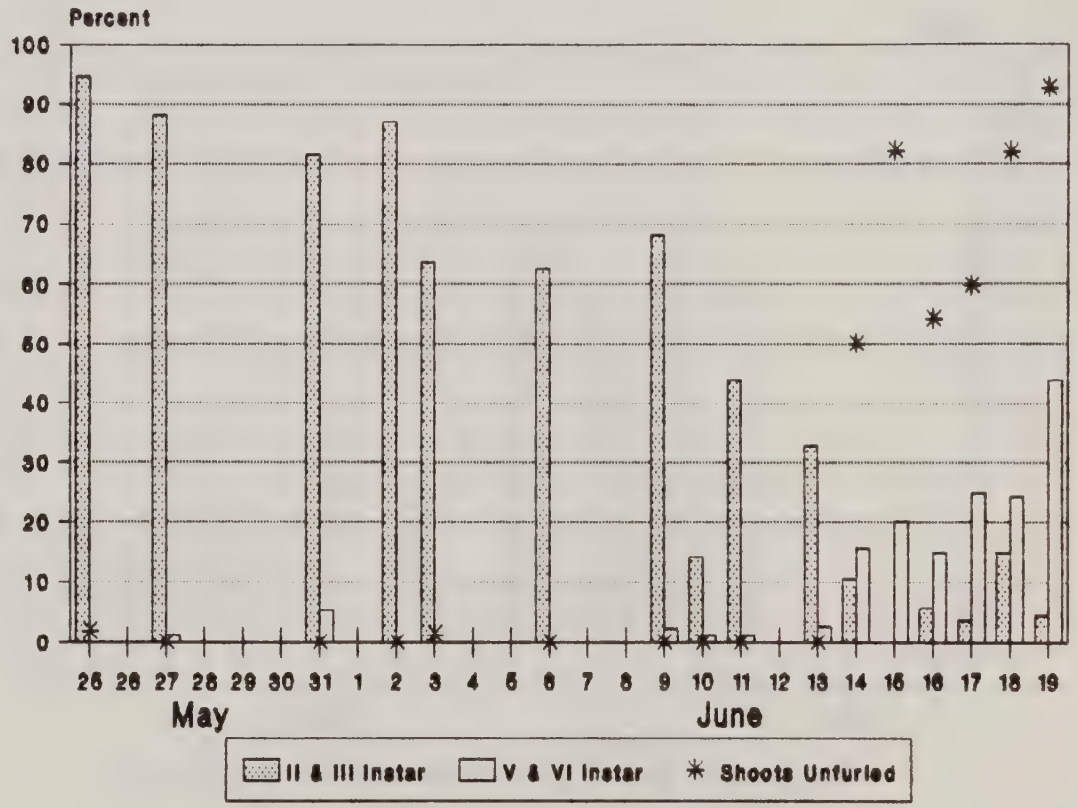
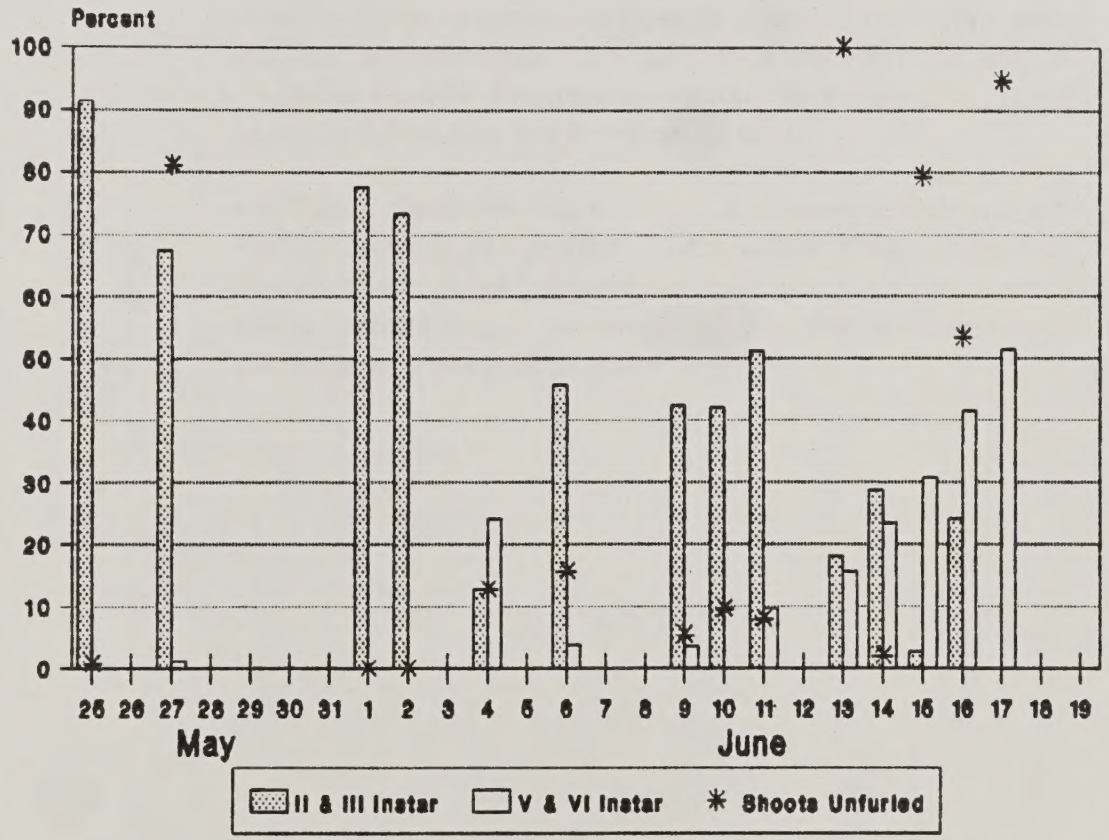


Meacham Pilot Project
Larval & Foliage Development
Block M16XD



This publication reports pilot project results involving pesticides. It does not contain recommendations for their use, nor does it imply that the uses discussed here have been registered. All uses of pesticides must be registered by appropriate State and/or Federal agencies before they can be recommended.

CAUTION: Pesticides can be injurious to humans, domestic animals, desirable plants, and fish or other wildlife--if they are not handled or applied properly. Use all pesticides selectively and carefully. Follow recommended practices for the disposal of surplus pesticides and pesticide containers.

Trade names and commercial enterprises or products are mentioned solely for necessary information. No endorsement by the U.S. Department of Agriculture is implied.